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MENTAL TESTS IN
CLINICAL PRACTICE

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THE HOUSE OF APPLIED KNOWLEDGE

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Crafty Ulysses plowed up the beach, the while he sowed it with salt. But when two wise old Greeks placed the infant Telemachus in his path, Ulysses turned his work animals aside, and the Greeks concluded that he was sane. Ulysses probably felt that the test was not sound; but he was too shrewd to argue about its merits, so he left off plowing and sailed away to Troy. For three thousand years thereafter, almost no progress was made in the art of mental testing. Under the common law of England, even in the eighteenth century, "the wild-beast test" prevailed, a man being considered sane and responsible for his acts unless he showed as little intelligence as a wild beast. Within a generation, however, testing and the technique of testing have developed into a science. It is with a phase of this science — the clinical application of psychological methods — that the present handbook deals. It is offered as a students' text and as a reference book and guide for clinical examiners. That it will make for greater caution in test procedure and for a broader-minded interpretation of test data is the hope of the author and the publishers

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PREFACE

"GIVE administration a chance to catch up with legislation" was an early counsel from an American legislator destined to become historically famous. In the smaller world of mental tests there is proportionate need to give administration a chance to catch up with invention. Of the making of many tests there is no end. Careful work of this kind serves an essential purpose, but manuals of directions and norms seldom suffice for the intelligent use of tests. Questions continually come up in laboratory practice with which manuals of directions cannot deal. The applications of a technique to the study of individual cases, and its place in the system of available psychometric method, are with difficulty learned from those manuals of procedure, each of which is naturally and properly concerned with setting forth its particular technique as such. To these basic sources, such as Terman's *The Measurement of Intelligence* (1)¹ or Pintner and Paterson's *A Scale of Performance Tests* (2), this volume offers a supplement of experience gained by their means. In no sense can it replace them; on the contrary, it assumes them. It does aim to enhance the usefulness of these contributions, by going into details of practice whose significance has since developed and by case illustrations of their application to the study of conduct problems.

The advanced student will recognize that the present volume is no compendium, and the beginner must not regard it as such. It discusses in detail the methods with which the writer's laboratory has had the most experience. There are quite useful procedures which for various reasons do not find place here. The Ferguson Formboards (3) are examples of very ingenious psychometric devices to which there is little further allusion in the text. This is hardly

¹ See numbered references on page 301.

inconsistent with the volume's introductory purpose. In general, the citation of references does not include material of date prior to 1918. Excellent source books for earlier material are available (4, 5, 6, 7, 8); a working knowledge of the *Psychological Index* may also be assumed. As this volume goes to press, word is received of the completion of another fundamental source book in psychometrics, *Manual of Individual Mental Tests and Testing*, by Bronner, Healy, Lowe, and Shimberg (Little, Brown & Co.).

As a name for the technology of mental tests there has been introduced the term "psychometrics." It has also been opposed, on grounds which seem to apply equally to any distinctive name for the field. In default of a distinctive term of some kind, the practice of calling the tests "psychological" and the person giving them a "psychologist" may be expected to continue, and it is as partly obviating this that the term "psychometrics" has found favor. The most cogent objection is that it meets only half the language requirements. "Psychometrics" as a technology and "psychometric tests" as its subject matter are at least phonetically acceptable, but "psychometrist" or "psychometrician" is less satisfactory. The point may be made that the name is superfluous, since the type should not exist; all persons making mental measurements should be psychologists in the full sense of the term. Possibly, but the suggestion is not practical; the "mental tester," perhaps to be so designated, has become a distinct factor in applied psychology and not a transitory one. Fortunately these dictional questions have a way of settling themselves apart from conflicting individual preferences. In the present volume the adjective "psychometric" and the noun "psychometrics" are employed according to convenience.

The subject of mental tests is approached from differing backgrounds, from that of a collegiate discipline to that of

the holder of a doctorate who wishes to add it to his accomplishments as one might a reading knowledge of Italian, or that of an administrator who must know how to use psychometric results. All these points of view can hardly be met in a single volume. The one adopted is that of the student preparing for advanced work in the field. In the nature of the topic, fact and formulation are incidental to accomplishment. The volume is not intended as material for learning, but as a guide to practice. The exercises are thus as integral a part of the presentation as any portion of the text. Review questions of the first two chapters can profitably be reconsidered after the volume as a whole has been gone through. Through the seventh chapter the volume is meant to be used "in parallel" with the standard manuals of the techniques discussed, such as those of Terman or of Pintner and Pater-son. The chapter on memory describes a procedure originating at the Boston Psychopathic Hospital. The chapter on the free association experiment aims to summarize the method to date and goes somewhat more into minutiae than do the earlier chapters. The next chapter outlines the rôle which the clinical psychologist may expect psychometric methods to sustain in such vocational questions as come to his attention. The conduct of a psychometric laboratory involves many ordinary details of office practice. System in these matters may not be essential, but it is useful, and a brief presentation of these details is included. A final chapter discusses some approaches to personality traits which are still on the frontiers of psychometrics.

The case material is selected from the point of view of showing how the methods discussed bear on the management of the case. Details of histories are not generally gone into save as they are relevant to the understanding of the psychometric features.

It was desired to make the documentation rather full, to

facilitate advanced study. The usual system of footnotes would be cumbersome in a case like the present, where certain sources are referred to many times. The plan has been adopted of assigning a number to each volume or article of reference, according to the serial place it occupies in the reference list (pages 301-310). Each reference to the sources gives the serial number in italic type, any special pages referred to following in ordinary type. Thus a reference to page 152 of Terman's *The Measurement of Intelligence* would appear as (1, 152).

The volume is indebted in some degree to almost every one who has been of the laboratory staff during the past five years, but in particular to Miss Edith F. Symmes and Miss Barbara Kendall, who have assisted indispensably in the editorial preparation of the manuscript. For the follow-up data of the case histories, the obligation is to the social service department of the Hospital, under the direction of Miss Suzie L. Lyons, and temporarily of Mrs. B. L. Sullivan. Special obligation exists also to Mr. Johnson O'Connor and to his organization, the West Lynn Works of the General Electric Company, for various methods utilized in connection with vocational questions. Among publishers, Houghton Mifflin Company, Warwick & York, Inc., and the *American Journal of Psychiatry* have courteously allowed the use of a special amount of their material which was desired for the present work.

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BOSTON, MASSACHUSETTS

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EDITOR'S INTRODUCTION

A TEXTBOOK on the use of mental tests in clinical practice has been sorely needed for many years. In view of the fact that historically mental tests had a clinical origin, it is surprising that we should have had to wait so long for an authoritative book of this type. Binet and other psychologists of his day were interested primarily in the analytical study of the individual. Later the standardization and improvement of mental test methods gave us techniques less difficult to master and therefore capable of more widespread application. This had its great advantages, as nearly all are now willing to admit, but it has brought with it the unfortunate tendency to replace clinical analysis of individual cases with statistical treatment of mass data in which the individual is represented by an impersonal score.

For certain purposes, particularly in investigational work, statistical methods are of course indispensable, but in the application of psychological tests in the school, in the juvenile court, in the psychopathic hospital, or in industry, our point of view should be more clinical than statistical. This ought to be the case even when group tests are used. There is little to be gained in measuring classes or schools as such. Our need in the vast majority of cases is to enlarge our understanding of the individual subject. It is possible to use group tests in such a way as to make them contribute to this end, but in our present pursuit of wholesale testing there is danger that the clinical point of view will become obscured. The time will never come when individual examination methods can be entirely replaced by group methods. More and more we should strive to supplement our wholesale testing with clinical examinations of individual cases, even though the latter is relatively expensive.

Wells's *Mental Tests in Clinical Practice*, because of its

intrinsic merits as well as because of the present need for such a book, is undoubtedly one of the most important additions to mental test literature of the last decade. It will take rank at once as easily the outstanding text in its field to date. It is the combined fruit of sound psychological scholarship, thorough acquaintance with mental test literature, and extraordinarily rich experience in the clinical application of psychological methods. The book will find large usefulness as a classroom text in normal schools, colleges, and universities, and will prove itself an indispensable handbook for the clinical examiner of every grade of expertness. Its influence will make for greater caution in test procedure, for broader-minded interpretation of test data, and for a more liberal appreciation of the contributions and points of view of those working in allied fields.

A book of this kind necessarily treats many topics on which legitimate differences of opinion still exist among competent psychologists. The author has not hesitated to take a stand on disputed questions, but he does so with a commendable freedom from dogmatism or intolerance.

The author's style, always clear and interesting, is enlivened throughout by an element of humanism that is especially welcome in a book designed as a guide to the study of individual mentality and personality. No one recognizes better than the author that a human being, as a psychological subject, is something more than the sum of a series of mental test scores.

LEWIS M. TERMAN

MENTAL TESTS IN CLINICAL PRACTICE

CHAPTER ONE

SCOPE AND PROCEDURES

Definitions — Test standardization — Two approaches to psychometric problems — Psychometric work as a factor in case study

Definitions. There has arisen a definite technology of mental tests based upon psychological science. It deals with mental measurements made for the purpose of directing human adjustment to life. One may give tests in an industrial setting, to decide whether a person should be employed as a stenographer. One may give tests in an educational setting, to measure school progress. One may measure, in a clinical setting, the more general intellectual equipment of a person, to see if it is reduced beyond what the previous education and accomplishment would lead one to expect. The present volume is concerned with this clinical division of the field rather than the industrial or educational. As such, it deals with certain techniques especially suited to the study of individuals whose general behavior is more or less seriously maladjusted.

Given mental tests are not the exclusive property of clinical, educational, or industrial fields. The examiner avails himself of such methods as are suited to his problem, no matter what their origin. As a matter of history, the "Binet" tests had an educational origin, though their most efficient use is in clinical examination. The "association experiment" developed in a clinical setting, yet appears to have important industrial bearings. Various "group" tests of intelligence, developed from an educational standpoint, are more or less useful industrially but have only slight clinical application. The "Alpha" test, the first

important representative of the group-examination methods, was developed for military use.

A technology is often spoken of as an art, as the "healing art" or the "manly art." Thus is expressed the fact that one person may know as well as another all the rules that can be written, yet not do the work as well. No experienced examiner will dispute that art as well as science is included in mental testing. Getting into touch with subjects so as to elicit their proper efforts is vital to the examiner's work, yet no more than vague directions about it can be put on paper. The word "clinical" as used in the present connection is not the most fortunate of terms, but is apparently one that it is necessary to accept. At the worst, it is a lesser rhetorical tragedy than the use of "psychologist" to denote some one with a few months (or weeks) of training in giving psychometric tests; by which token "pathologist" would denote a cutter and stainer of sections.

Test standardization. The technology of mental tests implies the use of methods fairly well established and standardized. The Stanford Revision of the Binet-Simon Scale (1) and the Point Scale of Yerkes, Bridges, and Hardwick (9) are psychometric methods in this sense. On the other hand, an experimental procedure which is very refined, but with which there is only restricted experience, such as work with the "complication experiment," is ranged with the science of experimental psychology rather than with the technology of psychometrics.

The technology of mental tests is thus seen to embody a series of examination methods which on the basis of past experience can be used to disclose something of practical advantage about the person under observation. The term "clinical" applies to the use of such tests, if this person has some difficulty which it is attempted to understand and remove. A mental test is a psychological experiment

which is standardized. Such standardization, as Pintner points out, applies to the experiment in two ways (8, 82). Standardization "as to procedure" means that the test must set a quite definite task, which will be substantially the same for all persons. Judging the lengths of lines as given in the Binet scale represents a test fairly standardized as to procedure. The lines are of definite lengths, in the same positions on the card, and the position of the card with reference to the subject is specified. Refractive errors are the chief complicating possibility. A test quite serviceable, but hardly so standardized from this point of view, is that of naming the primary colors. Soiling of the card, and fading, will affect them more than the lines, there is more chance of slip-up in the verbal presentation, and the question of defective color vision is to be thought of. An unlimited number of "stunts," such as the recently popular crossword puzzles, can be made into mental tests by any one who will go through the work of standardizing them.

When in 1907 the American Psychological Association undertook through a committee the standardization of psychological tests, the effort was spent mainly on standardization of procedure. There were developed definite methods for measuring certain mental functions, but with only occasional reference to the bearing of the test on the function of the life adjustment of the individual. The mass measurements common today and the conceptions implied in progressive age norms were still in the periphery of psychologic vision (cf. 9 a, 32-57).

These ideas, indeed, like many others in human progress, had been temporarily laid hold of in advance of their time. The researches of Bryan (10) on "voluntary motor ability" and of Gilbert (11, 11 a) on this and other functions embody most of the elements in age standardization as it is recognized today (cf. also 9 a, 38-40). On pages 4 and 5 appear age

(a) SCORES IN A TEST FOR ACCURACY OF MOVEMENT (10, 195)

Age	6	7	8	9	10	11	12	13	14	15	16
Boys	R. 1.10	.97	.87	.80	.67	.65	.53	.58	.60	.42	.44
Girls	R. .91	1.01	.85	.86	.69	.69	.59	.61	.53	.49	.40

(b) SCORES (NUMBER OF TAPS IN 5") WITH RIGHT INDEX FINGER (10, 153)

Age	6	7	8	9	10	11	12	13	14	15	16
Boys	19.5	21	23.1	24.4	25.2	27.0	29.3	28.7	31.5	31.6	33.9
Girls	19.8	20.7	22.2	24	25.8	27.1	28.2	30.3	29.5	29.1	31.3

(c) SCORES IN ARM LIFT (KILOS) (11, 15)

Age	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Boys	33.8	42.2	51.7	58.9	68.5	78.0	85.7	94.3	107.1	130.1	138.4	158.3	171.9	171.9
Girls	25.4	32.2	36.3	45.8	44.5	52.2	58.5	69.8	76.2	81.6	78.4	81.2	82.6	88.4

(d) SCORES (NUMBER OF TAPS IN 5") (11, 27)

Age	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Boys	22.1	23.3	25.8	27.1	28.3	28.1	30.1	31.1	32.4	34.0	34.0	34.4	36.0	36.7
Girls	22.3	24.5	26.0	26.7	26.2	28.0	29.3	29.5	29.4	31.3	32.2	33.8	34.3	35.3

(e) "ESTIMATION OF LENGTH BY SIGHT" (11, 19)

Age	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Boys	10.7	31.2	38.1	44.4	46.5	46.7	44.7	46.7	46.5	50.3	51.5	53.1	54.9	57.1
Girls	12.7	20.3	29.7	31.8	38.9	46.5	41.1	43.2	48.3	46.7	51.1	51.0	52.1	51.5

(f) SCORES IN VARIOUS FUNCTIONS (11 a)

Age	6	7	8	9	10	11	12	13	14	15	16	17
Perception of weight (Difference perceptible in grams)	14.8	13.6	11.4	10.0	8.8	8.6	7.2	5.4	5.6	6.8	6.6	5.8
Perception of weight (% with no discrimination)	38	36	30	20	12	6	3	2	0	0	1	1
Color (brightness) sensitivity Least perceptible differ- ence no. shades	9.6	9.0	8.3	6.3	5.4	5.4	5.1	4.6	4.7	4.4	4.3	3.9
Color (brightness) sensitivity (% no discrimination) . . .	57	49	44	23	11	4	3	4	3	1	1	3
Tapping in 5"	20.8	22.5	24.4	25.4	27.0	29.0	29.9	28.9	30.0	31.1	32.1	33.8
Reaction time σ	317	309	287	269	233	210	207	205	191	184	170	170
Choice reaction σ red-blue .	558	541	488	475	422	405	389	399	363	348	340	321

norms, of contemporary aspect, determined by these investigators for various mental functions.

In those efforts of the above-mentioned committee, which were most concerned with what would today be called "intelligence" tests, the writer had some part. It is easy to recall, and the printed record (12) shows, how great was the emphasis on procedure and how limited that on norms. As a result there were produced tests of a fair degree of technical merit, but without the experience by which alone they might be put to practical application. A few have gained wider usefulness through standardizations supplied elsewhere. Now the pendulum is at the other extreme. The emphasis is on standardization as to results. Less attention is often paid to the construction of the test as such. A remark of Binet's cited by Terman (1, 77), "Let the tests be rough, if there are only enough of them," could be made to rationalize some very dubious procedures.

Standardization as to *results* means enabling one to rate a subject's performance in a test in comparison with that of his fellows. The typical standardization as to results is by ages. A task is set, and through extensive observation it is found at what age, say, 66 per cent of children can do that task. Most persons at or above the given age are expected to pass such a test; persons below it are not. The percentage of children at a certain age who should pass a test before it is assigned to that age is somewhat in dispute on theoretical grounds (13, 43-46).

One may find, as Terman does, that at eight years it is usual to define 20 words of his vocabulary test; at ten years, 30 words; at twelve years, 40 words; etc. Such a test is standardized for several ages, there being a characteristic accomplishment for each age. Tests so standardized play a large part in the Kuhlmann scale (13). It is also the standardization usual with non-language or "performance" tests.

Among the most useful types of standardization as to results is that by percentiles (8, 80-81). This enables one to say, for example, that the person is in the best quarter, or the third quarter, of his group. Or the process may be carried to a finer degree, enabling one to say that he is in the best 10 per cent, the fourth 10 per cent, or the eighth 10 per cent of his group. These percentile classes are known as "quartiles" or as "deciles," respectively. It is a very practical question how fine it is useful to make such scale divisions of human traits. Four divisions are often sufficient. Conditions calling for more than ten are rare. Too many are disadvantageous, offering pretensions to a degree of accuracy that does not exist.

In standardization as to results is the final proof of the psychometric pudding. By mass observations, and thus only, does one find whether a test is differential in a significant way; whether it will show something of service in dealing with a human adjustment problem. If a test is thus differential, few will cavil about apparent crudities (14, 101). On the other hand, the better the construction of a test, the better its differentiation is likely to be. The Stanford scale furnishes some interesting comparisons with the more elaborate Kuhlmann scale on this point.

Some tests are more differential than others because of the basic functions with which they deal. As a test, memory for digits is a more objective procedure than the Terman vocabulary test. Yet it is less differential for "intelligence." Vocabulary is more closely related to intelligence, and a relatively crude test of it is better than a very precise one of memory for digits. General psychological insight and the technique of test construction (13, 21-29) are somewhat serviceable in formulating tests likely to be most usefully differential. The verdict rests always with experience yielded by mass observation.

Two approaches to psychometric problems. There are certain factors in psychometric work which are inherently favorable to the above principle of "rough tests and many of them." The establishment of norms requires time-consuming observations on large numbers of individuals. Experienced psychologists (not "six weeks' testers") are with difficulty available for such tasks; neither is any but the simplest material equipment provided with facility. It follows that psychometric work done on a scale to establish norms is sometimes done by persons of moderate psychological background, hardly equipped to handle complicated experimental conditions or material. "Rough tests and many of them" have flourished in the psychometric field not because of being better in principle than fewer and more refined techniques, but because they were much the easier to establish on a general working basis (14, 235).

Over against the principle of the "general size-up" provided by a miscellaneous collection of tests is that of fewer but better-organized ones accompanied by fuller observation. The examiner must make as much as he can out of relatively few tests given rather than give many tests whose practical result is, as in the Binet scale, an overshadowing numerical score. The former procedure makes more demands on the examiner's capacity to observe and interpret — too much to make it applicable to psychometric work as commonly administered. It should be more valuable to the patient, as well as to the examiner who is more than a technician.

An early but comprehensive exposition of this principle is in a contribution by H. H. Young (15). The test concerned is a special type of formboard (Witmer), but the points made are applicable in psychometrics generally. He says pertinently:

Perhaps the chief obstacle to a more rapid analytical development of tests has been the desire to express results in quantitative terms in order to establish norms for comparative purposes. To accomplish this aim, investigators have been forced to posit and assume that the particular tests which they were standardizing tested only one quality, as memory, imagination, form perception, or rate of movement. If, however, the investigator was aware that other factors were involved . . . he failed to give them the prominence and emphasis necessary to prevent others from . . . being content to assume that only one quality is being tested. . . .

He classifies a considerable number of mental factors entering into the test, which conversely can be gauged by the test reaction. Among them are energy, initiative, dexterity, alertness, planfulness, retentiveness. The subject is rated in respect to these things. Such detailed charting of the test reaction is a procedure adapted to special conditions only. Most examiners able to utilize these conceptions will prefer to discuss only such features of the test reaction as are actually salient.

In observing the reaction to individual examination in general, the following kinds and levels of behavior may conveniently be distinguished :

1. *Willingness*

- A Enthusiastic eagerness for experiment
- B Actively enters into the experiment
- BC Normal attitude ; because proper
- C Because must ; a disagreeable task
- D Active objection

2. *Effort*

- A Utmost capable
- B Perceptibly exerts self
- BC Normal effort ; neither indifferent nor overconcerned
- C Perfunctory, embarrassed, or distracted
- D Apathy

3. *Physical Activity*

- A Marked agitation or excitement
- B Above normal, fidgets
- BC Normal, including drumming or stretching
- C Only as examination demands
- D Notably retarded

4. *Speech*

- A Talkative, interrupting examination
- B Above normal, spontaneously on irrelevant subjects
- BC Normal, conversational
- C Does not speak spontaneously
- D Replies only after much urging or not at all

5. *Autocriticism*

- A & B Overcritical of self, thinks that successes are failures
- BC Normal insight into work
- C & D Little or no realization of failures

6. *Attention*

- A Preoccupied with experiments, little if any interference from stimuli ordinarily distracting
- B Normal attention to other things may be shown, but not such as to impair efficiency in experimental tasks
- C Distracted by chance extraneous stimuli or by own ideas; may comment on these irrelevantly during examination, but readily reverts attention to experiments
- D Abstracted, difficult to get attention to experiments; keeps reverting to topics of more immediate moment to him

7. *Understanding of Directions*

- A Grasps experimental tasks before usual instructions are completed
- B Requires no elaboration of usual instructions

- C Grasps idea after little supplementary explanation
- D Comprehends tasks only after unusual elaboration, or not at all

The value of such analyses depends on how far the test reaction is representative of the subject's reactions in general. This is the distinction formulated by H. H. Young as between *epideictic* capacity, that shown in the test, and *hyparcetic* capacity, that which actually characterizes the personality. On it rests the practical significance of making the tests, and it is hazardous to gauge it on the basis of test reaction alone. To do this at a good level requires the additional knowledge of the patient's history. How far this may be practically available for a psychometric report is somewhat an administrative matter. It may be proper to make some psychometric report with very little knowledge of the history, but the experienced examiner does not function to the best advantage unless his reports are based on biographical as well as psychometric data. To some extent this is true of studies from any angle, but it is of outstanding importance in the interpretation of psychometric work.

Psychometric work as a factor in case study. The general place of psychometric work in the management of a conduct problem must be understood. Cases have been reported of clinical advice given on the basis of an "intelligence" test. Such procedure is admissible by neither psychologists nor medical men.¹ Test reactions are but one limb, so to speak,

¹ In speaking of "intelligence" tests and "mental age," the words are used in a sense misleading to the layman, a difficulty from which psychologists have not wholly escaped. The word "mental" denotes emotional and other behavior patterns outside the broadest definitions of intelligence, to say nothing of traits actually measured by the tests. As to the definition of "intelligence," though different formulations are used by various authors (8, 56-57), disagreement is not practically serious. "Ability consciously to adjust one's thinking to new requirements" will serve for present purposes as a fair description of what typical intelligence tests measure. One must, however, interpret "ability" broadly and "thinking" strictly. One's

of a complex organism, and we cannot yet, with the assurance of the biologist, reconstruct the organism from the most careful measurements of that one limb. One may pertinently cite here the topics into which the late W. E. Fernald classified the study of cases, for no formulation passed through a more searching practical test :

1. Physical examination
2. Family history
3. Developmental history
4. School progress
5. Examination in school work
6. Practical knowledge
7. Social history
8. Economic efficiency
9. Moral reactions
10. Psychological (psychometric) tests

The comparative rôle of medical and psychological factors in the above list is worth scrutinizing. Such topics are likely to have varying weights in different cases, because equal information cannot be obtained about them. Information on family history or moral reactions may be inaccessible or misleading. The most accessible topics are the immediate characteristics of the patient, as given in physical and psychometric examinations. Here has lain

"ability" in a test, as represented by the performance, is naturally conditioned by willingness, effort, freedom from preoccupation and emotional strain, etc. Further, the typical intelligence tests are tests of ability to manage *ideas* (Thorndike's "abstract intelligence") as apart from ability to manage things (Thorndike's "mechanical intelligence") or other persons (Thorndike's "social intelligence"). They most concern the thought processes as such, not the manner in which these will be expressed in action. Hence intelligence tests break down as criteria of general mental balance. All degrees of superior intelligence scores, in persons with severe disorders of both thought and conduct, are observed by every one experienced with psychotic cases. Under no circumstances is one entitled to infer mental normality from any "intelligence" score. (Cf. 16, 227-235; 13, 15; 17, 123, 247; 18, 10; 119, 34.)

the latter's special value. It gives more information about the case in proportion to the resources needed to get that information than other means of mental examination. A wise remark, attributed to the late Dr. Southard, was that one hour with a case is often best spent in psychometric examination, but given five hours, the advantage lies rather with the less organized but more flexible methods of clinical psychiatry. Save where behavior is gravely disorganized, as in a delirium, psychometric findings are not much less accessible than physical ones. Other data may be impossible to obtain or are but meagerly obtainable. The social history may in the end overshadow the psychometric findings, or vice versa. The immediate medical situation may dominate both. The interest of the patient calls for the understanding of all these factors by responsible authority. For traditional reasons, this is generally a physician. Less often it is a non-medical psychologist. It might be neither of these, but instead some one to whom their judgments were accessible, having breadth of vision and practical knowledge to make wise decisions therefrom.

Somewhere in the organization, however, there must be knowledge of what psychometric findings mean in relation to the total setting. A psychiatrist who thoroughly understands psychometric methods may profitably utilize results gathered at the technician level. A broadly trained psychologist with a knowledge of clinical histories may coöperate effectively with a physician unfamiliar with psychometric principles. A psychometric worker with neither background of general psychology nor knowledge of the case history will contribute but little of use to a physician unable to read a psychometric record form.

The question of particular psychometric techniques to use in a mental clinic must be given some attention in organizing it, since it interlocks with equipment to be provided.

It is governed by the resources of the clinic in money and personnel and by the time available for psychometric work. The policy to be pursued in these respects is less important than the securing of a competent examiner, and it is the latter who should decide the question in the light of the special conditions. For any clinic those methods are best from which the examiner can get the most. An organization dealing intensively with a limited number of cases may find it advantageous to cover a wide range of psychometric procedures. An organization with perhaps a wider range of problems, dealing with many more individuals, and with corresponding limitations in time should have at its command a number of fairly definite psychometric methods and should select those most relevant to the case. The present volume develops under experience of the latter type.

Mateer sponsors a psychometric system including the Stanford test, non-language tests, and the Kent-Rosanoff free association test, suitably analyzed (17, 80-81). This refers especially to requirements of children. The minimum to be sought, from the point of view of child guidance, is the Stanford scale and a group of some ten of the more established non-language or "performance" tests — the former, because it is likely to be for some time the best understood of the Binet revisions, the latter to meet foreign-language difficulty or cases of special verbal ability or disability. Such test series are adapted to simple determinations of intelligence level, and more can seldom be expected of them. The governing factor in what further material to provide is the special experience of the examiner.

REVIEW QUESTIONS AND EXERCISES

1. What is the place of psychometric methods in experimental psychology?
2. What are three general applications of psychometric methods, and how are they related?
3. Describe the meaning of "standardization" as applied to mental tests.
4. What differences in point of view are illustrated in the citations from Binet and from Young?
5. Name features of the subject's general attitude toward the examination that ought to be observed.
6. How may one classify the sorts of information that should go into a well-rounded case history?
7. For what departments of this information are the physician, the social worker, and the psychologist naturally responsible?
8. In organizing a psychological clinic, how should one decide as to the psychometric equipment to be installed?
9. Record forms of tests mentioned should be exhibited, and the students may take a *brief* group test (such as Bixler's, without scoring).
10. Various single tests from the Stanford scale may be illustrated with projection apparatus — e.g., Tests IV-1, VII-2, X-3, XII-4 — and discussed with reference to the points made on pages 6-8.
11. Samples of educational and industrial tests should be exhibited.

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CHAPTER TWO

GENERAL EXAMINATION METHODS

Elements of examining methods — Examination surroundings — Attitude of the person examined — Acquiring technique — Directions for giving tests: their use and abuse

Elements of examining methods. That examiner is generally regarded as the most successful, who, while preserving the experimental conditions, elicits responses of the highest level from the subject. A variety of factors naturally contribute to this end. From a practical standpoint some are important, like the emotional condition of the person examined; some are worth heeding, like the use of reasonably fresh test material; some are largely matters of convenience, like the relative directions in which subject and examiner face. In the discussion that follows, the reader is asked to keep these proportions in mind. The points to be considered may be classified as they deal (1) with the surroundings of the examination, (2) with the attitude of the person examined, and (3) with the conduct of the examination itself.

The personal equation enters largely into the conditions demanded of psychometric work. The writer has heard of a very competent examiner's feeling inhibited from giving a Stanford test because no stop watch was available. If one were bound by all the counsels of perfection formulated in regard to mental tests, not enough tests to standardize a method would be made. There are optimum conditions for psychometric work, and it is well to know what they are and to make all reasonable effort to reach them. It is inappropriate to be blocked in one's psychometric work because they cannot be realized. One must not confuse optimum conditions of work with necessary ones. The competent examiner is always entitled to do what he can with what he has, whether or not it appears to be an obligation to do so.

Examination surroundings. The physical environment of psychometric examination is generally discussed from the standpoint of children, with whom most psychometric work is done. The best available surroundings are more important in the case of children; adults are in general less subject to distracting influences. One may assume that a room is available in which psychometric work has at least the right of way. Terman suggests a rather small room "because it is more homelike." Fourteen by seven feet is amply large, and much smaller spaces can be utilized. Freedom from distraction is more important than size. The space should be secluded as far as possible from noises of the street or of other parts of the building. Proper illumination is vital. The uniformity of artificial light alone, Smith¹ considers offset by its unusualness. He suggests the use of frosted glass in the lower window sashes against the distracting influences of objects seen outside the laboratory. He also calls attention to the avoidance of direct sunlight by northern exposure and to obviating shadows by indirect (artificial) illumination; further to the proper placing of examiner and subject with reference to the source of light.

Terman (1), Kuhlmann (13), Yerkes (9), and Smith all speak for simplicity in furnishing the examining room. "A table and two chairs are all that is necessary." Smith, however, notes that it should not seem "strangely bare," and Mateer (17, 84) finds it desirable to have attractive toys available for stimulating the child's interest. Smith adds the suggestion of light gymnasium apparatus. It may be very difficult to provide a room devoted exclusively to psychometric work, and one must not exaggerate the importance of so doing. There are objections to combining a psychometric

¹ The allusions to the work of Stevenson Smith in this chapter are to an admirable review of examination conditions by this authority, which remains unpublished.

laboratory and an office, but these apply more to psychotic adults than to children. It is improbable that the presence of a desk, a bookshelf, and some filing space vitiates responses to any significant extent. Their influence is minimal beside the personality of the examiner.

An especially active clinic may, as Smith suggests, be provided with furniture adjustable to the bodily growth of the patient. In any case the competent examiner gives all practicable attention to the postural comfort and convenience of the patient while undergoing examination.

Interruptions of psychometric work are disturbing but have to be reckoned with. Examiners will probably find it less disturbing to have one enter the room quietly, without knocking. A room used solely for examining is better without a telephone bell or instrument. Except as attached to a telephone, the visual signal suggested by Smith has the limitation, where psychotic cases are involved, that it may be unwise for the examiner to leave the patient. Further remarks on laboratory furniture and equipment will be found in Chapter XI. Those concerned especially with pre-school children should also consult Baldwin and Stecher (48, 18, 50-51, 180-200).

Attitude of the person examined. Though the physical surroundings fall far short of perfection, excellent psychometric work will be done if the examiner is well chosen. The "job specifications" have been clearly formulated by others; e.g., Kuhlmann and Mateer. The essentials are contact with the patient and mastery of the technique. Mateer favors women on both counts, and on the first her opinion will hardly be questioned. Though the "kindly-uncle" approach is effective and the best of both sexes are probably equal, it is certain that women as a class establish contact with little children better than men do. As a matter of fact, though not necessarily for this reason, the bulk of psychometric work is

done by women, and thus it is likely to continue. Their advantage tends to disappear in the moderate amount of work done with adults, especially psychotic adults; indeed, some of this work all but must be done by men. The writer's experience does not indicate any difference between men and women as to mastery of technique. A minimal intelligence quotient for intelligence testers themselves is not determined; it may at least be hoped that none fall below a "par" of 100.

The personality of the examiner is a governing factor in the attitude of the subject. A further point that comes up in this connection is the question of visitors. In general, the presence of a third person in the examining room is a disturbing factor. The result will not be as representative as it would be if the visitor were not there. Whether it is sufficiently disturbing to prohibit the presence of visitors is another matter. Kuhlmann argues in this direction (13, 74-75). Older subjects, he remarks, are less affected by strangers than by relatives or associates; yet he is unqualifiedly against any third person's presence during such an examination. Children under ten he believes not to react so unfavorably to strangers, but the presence of associates is inadmissible. Terman is somewhat more liberal, but cautions especially against the presence of a child's elders. Yerkes and his colleagues voice a similar opinion. Any third person present should sit behind the child and give no evidence of taking notice. The concession of an assistant to take notes appears strange now, when one would question the competence of an examiner who could not make his own observations. Burt (19), in some excellent comments, takes an attitude comparable to Terman's and cautions against leaving the child unoccupied any length of time, as while the examiner is taking notes. Mateer is more liberal still and recognizes circumstances where the presence of a third person may be of help. With very young children it is often possible to elicit

test reactions to the parent which the examiner unaided cannot elicit. Where foreign language enters in such cases, the parent may also serve as an interpreter. Mateer finds it useful in establishing sympathetic contact with the parent, and to some extent even stimulating to the quality of the examiner's work (17, 74-77). For purposes of demonstration and instruction, examinations in the presence of others must of course frequently be undertaken, with subjects selected therefor.

Mateer cautions against hours of examination ill adjusted to the sleep habits of very young children; Kuhlmann advises against the utilization of normal play hours, particularly the recess period. As regards school children, Gregory (31, 176) inclines to a rather elastic policy for examination periods.

Smith's cautions regarding the bodily comfort of the patient (clothing, full bladder, orthodontic treatment) are important, and too easily disregarded. Defects of vision or hearing are not the ordinary concern of psychometric measurements. It is clear that they can seriously affect the results. It is not always practicable to obtain records on this point prior to examination. The examiner must be on his guard that his findings are not vitiated from this cause. In standardizing a test by mass results, the difficulty is less important than where the essential thing is the accuracy of a single examination.

Most writers caution the examiner not to plunge *in medias res* with the subject, but to devote a few minutes wholly to the establishment of a working relationship. This is more particularly applicable to children. "First to the room, then to the test material, then to the examiner" is Mateer's counsel on the adaptation of children under six or seven (17, 75). Conversation should start before a child reaches the desk, says Yerkes, and if brought to the room by some one else, the

examiner should greet him, "Hello, what's *your* name?" (note accent) (9, 16). "Open conversation," says Terman, "about matters likely to be of interest. The weather, place of residence, pets, sports, games, toys, travel, current events, etc., are suitable topics. . . . When the child has begun to express himself without timidity" . . . one can proceed with more essential matters. A little "walk around the block" is suggested for more difficult situations. The actual tests are uniformly and naturally preceded by taking such data as the name, schooling, etc., which with older subjects are themselves generally sufficient "shock absorbers" (Kuhlmann, Mateer). Kuhlmann (13, 72) even advises against irrelevant preliminaries with subjects who already understand the situation well. In general there is at least as much danger in overstrained effort at *rapport* as in leaving it to take care of itself. Save where the patient is obviously out of touch, one needs little more than to present the essential contents of the examination with "kindness, firmness, and justice."

Mateer favors genuine preliminary explanation of the tests with all but the youngest subjects. There is no doubt that this is valuable when tactfully done, and its value increases as the subject matures. Recourse to the "game" idea is legitimate with those who can enter into a standardized situation on no other terms, but deception of the subject as to the purport of the tests is as little to be countenanced on practical as on ethical grounds. For mature persons it is impossible to formulate a better justification for the work than the apparent one; the individual is somehow in difficulties, which the examiner is helping to understand and remove. If the examination cannot be "sold" on these terms, the patient is little able to profit by it.

Kuhlmann (13, 70) stresses the value of encouraging remarks, even to hyperbole, with younger children. With older

persons more reserve is obviously necessary. Yerkes gives the general rule to "treat each subject in the way which he will consider most sincerely complimentary" (9, 17). One must be prepared to deal with the adult's asking "Is that right?" when error is actually made. Without stating the response to be correct, the answer must be in such terms as not to discourage the subject. Avoiding the "all-or-none" impression, one can still make the subject feel that he has done as well as could reasonably be expected of him, with a proper modulation of the phrase "good enough." In general, one should avoid setting the tasks in any form that questions the subject's ability to do them. Tell him to do it; do not ask him if he can. Say: "Tell me what this word means. You know where the hands of the clock would be. What lesson does that teach? Show me your right ear. Let me see you make one like this." Do not say: "Do you know what this word means? Can you tell where the hands of the clock would be? Do you know what lesson that teaches? Can you show me your right ear? Can you make one like this?" etc.

Owing to the special circumstances of a psychometric interview and the emotional strain it is likely to cause a subject, the balance of probability is in favor of his not doing as well as he does in the tests of daily life. The patients of a clinic are likely to be thus affected more unfavorably than those with whom the tests were standardized. It is thus reasonable, as Kuhlmann recommends (13, 72-73), to give the subject the benefit of the doubt in all cases of response on which the standard authority does not clear up. If the examiner stares at the subject, particularly while repeating test material, such as digits or sentences to be remembered, the performance is likely to be vitiated through self-consciousness or embarrassment. The function of the examiner is to draw out the subject, not to impress him. Always the subject

should feel that the examiner wants him to make the best showing he can and that he is not in the least trying to catch him in error. Kuhlmann (13, 76) also cautions against overmuch writing by the examiner during the interview, as likely to be embarrassing to the subject.

Acquiring technique. Inasmuch as, for the reasons already set forth, psychometric methods frequently come into the hands of those with little scientific background, special emphasis is laid on the preservation of prescribed experimental conditions. Burt (19, 15), Kuhlmann (13, 62), and Pintner (8, 82) speak with special force on this point, and those who have taught psychometric work will find little exaggeration in their words. The details that must be borne in mind regarding an age scale are beyond the scope of most memories, especially for those whose experience is concentrated on certain parts of a long intelligence scale. Here lies the difficulty with abridged guides to psychometric methods, against which Kuhlmann warns. Questions are sure to arise on which the abridgment will be silent.¹ Some students make condensed notes of their own for personal use. The objection to this is less strong. As a practical matter some measure of learning ability must be conceded, as well as some discretion in selecting the matters on which memory will need most refreshment. Psychometric examiners can hardly be expected forever to examine with one eye on the patient and the other on the standard manual. Special matters selected for attention in personal notes are less likely to be neglected than if buried in a mass of familiar detail in the standard manual. The value to examiners of from time to time running over tests with each other can hardly be overstated. In default of this, frequent

¹ At the same time, authors of tests who are desirous that their instructions be followed with special closeness should observe the propriety of making their standard instructions as full and specific as possible. Instances will subsequently appear where matters of distinct import to the difficulty of a test are unmentioned in its official directions.

review of the standard manuals is advisable. In the earlier stages of study it is useful for one learner to examine from notes and memory while another "holds the book" on him and criticizes his procedure in detail. "Shadow testing" of an imaginary subject is a serviceable means of individual study. Before one endeavors to conduct examinations himself, the learner should observe examinations given by as many different and more experienced examiners as practicable. In these sessions one should take notes of responses just as if he were the examiner, score them, and discuss them with the examiner. Where verbal responses are used, he should note as much of them as determines the scoring and discuss his scoring of these with the instructor. The next step is for him to conduct an examination by himself. He will need further criticism of experience, but it may be best to let him begin examining alone without the embarrassment of the critical presence. One runs a certain risk of forming false testing habits in this procedure. Full notes should be taken and discussed with the instructor. Finally, the instructor should "sit in" with the learner and offer such suggestions as still present themselves. It is often desirable to have the advanced learner give an entire test series to the instructor, who acts at once as subject and critic.

Such procedures are recommended for intensive training where the resources are available, but it is sufficient to have a sense for experimental conditions in psychology and opportunities for practice. Given these, one can master an explicit standard manual, like Terman's *The Measurement of Intelligence*, with little or no instruction. Terman insists on a psychological background and feels that twenty or thirty examinations is a reasonable apprenticeship (1, 107, 108, 126). Kuhlmann (13, 15) finds that a few weeks of training suffice for some 10 per cent of grade teachers to master his considerably more difficult technique. The mere going through

the motions of the Stanford scale is hardly beyond the powers of a bright high school graduate. But this is not half the story. The letter of such instructions is possible enough to follow, only in so doing one is exposed to serious violations of their spirit. The making of an expert psychometric examiner lies not so much in the learning and following of rules as in an adequate appreciation of their "elastic limits."

Directions for giving tests: their use and abuse. An intelligent South Sea Islander, observing a psychometric examination, would be likely to regard it as a magic rite designed to propitiate friendly spirits in the patient's behalf. Should he observe a conscientious examiner in the apprentice stage, tightly clinging to forms prescribed, his idea would be confirmed, for none knows better than himself how slight a departure from the required formulæ will not only destroy their beneficence but may well deliver the hapless sufferer into the hands of malignant ghosts.

Over against such esoteric views of psychometric methods is the customary and pragmatic one. The function of psychometrics is not the accomplishment of a ritual, but the understanding of the patient. The ceremony of mental tests is valuable so far as it serves to reach this end. When it fails, or stands in the way of doing this, proper technique demands that it be modified. Ability to do this intelligently is what distinguishes the psychologist, properly so called, from the "mental tester" (1, 131).¹

Smith well says that "whether or not the instructions are similarly given to all subjects, there will be differences in comprehending them." But the means to the end of psycho-

¹ True, there are memories that counsel caution in the matter of liberties with psychometric ceremonial. An examiner who had given some hundred Stanford tests was observed to be reciting the memory digit series at breath-taking speed. On inquiry, it developed that the instructions were understood to call for repeating an entire series in one second, instead of one digit per second.

metric work is to make the required tasks of the subjects as nearly the same as we can. Experience presents many situations in which literal adherence to the standard thwarts this purpose instead of serving it. Among the simplest of these arises in giving to an adult, as one occasionally must, the third test in the eighth year of the Stanford scale. No examiner in his senses would adhere rigidly to the formula prescribed for this test: "What's the thing for you to do when you notice on your way to school that you are in danger of being tardy?" The situation represents, in essence, a routine appointment of some importance to keep, and in this form it is properly presented to the subject. It involves merely the substitution of "work" and "late" for "school" and "tardy." It happened that the writer's early experience with the Stanford scale was with individuals whose social level was not adjusted to this form of question. "Appointment" was fairly satisfactory in these cases.

Terman's ball-and-field test invites special discussion from this angle. The ball-and-field situation appeals to the imagination of the school child in a rather special way — not at all as it appeals to an adult laborer or to an elderly lady of leisure. The essence of the situation is a desired object lost somewhere in the field. One will have a test more like what the ball-and-field test is meant to be, by using an object which to their desires is the same as the lost ball is to the school child's. The soldier-and-lost-pistol situation previously suggested (20, 25) is useful with subjects tending to rationalize the test to an extreme degree. A pocketbook containing a suitable sum of money is perhaps most generally serviceable. Occasionally an engagement ring gives the best stimulus to the imagination. One must try to posit an object which the patient would look for in the same way that the schoolboy would for the lost ball.

Another illustration may be given from the point of view of

scoring. The Pintner and Paterson norms for various non-language tests are derived from first performances of the test. As a rule, of course, this is also the least good performance; but if one has a subject repeat the performances, one occasionally finds his later performance inferior to his initial one, which was a chance success. Should one then score him on the basis of the chance success? The law says yes; but the prophets, if they were also men of science, would probably say no — that the slower performances, showing not simply their own inferiority but inability to profit by previous success, were the fairer gauge of the subject's reaction. Otherwise one is rating an initial chance success by an average into which chance success enters only in a minimal degree; for the chance combinations that fail of solution are far more numerous than those which will give it. There is no justification for scoring by an improvement on initial performance, unless this is expressly provided for in the directions and norms.

The norm for a test is derived from the average reaction of subjects to that test and represents the reaction of the average or composite subject. It includes indefinite variations of attention, interest, attitude in general, chance success, and failure. The norms are for the test as it presented itself to the average. That a subject may be most fairly compared with the norm, the test situation must mean to him what it meant to this average or composite subject whom the norm represents. A lost purse represents to an elderly lady much more nearly the same test situation as the lost baseball to a schoolboy, than the lost baseball would to her. That examiner is thus the most skillful who can represent to the patient the test problems in those proportions which are closest to those by which the norm was derived. If one makes literal directions a Procrustean bed to which all minds, young and old, male and female, butcher, baker, and candlestick

maker, must fit themselves, a competent examiner will vary the experimental conditions and violate the spirit of the instructions far more than he will in using his good judgment as to literal variation. "We strain at the gnat — the differences in the external conditions under which the test is administered — and swallow the camel — the enormous subjective differences under which the test is received" (Kent). An examiner incompetent for such corrections is hardly fitted to work unsupervised. All of which is but another guise of the old truth that he who has well learned how to keep rules will also learn to serve them better by occasional departures from their literal sense (1, 132).

REVIEW QUESTIONS AND EXERCISES

1. What should be the examiner's general procedure with reference to the attitude of the subject?
2. Discuss the physical surroundings to be desired for examination purposes.
3. Discuss the question of visitors.
4. How would *you* go about making contact with an apparently normal seven-year-old boy brought to you for an intelligence test?
5. Give instances where the standard form of test directions may be unsuited to the person examined. Why is it unsuitable? How would you meet the difficulty?
6. What methods and precautions are advisable in acquiring the Stanford technique?
7. The instructor should give from one to three demonstrations of the Stanford scale, covering as much of the scale as is practicable.

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CHAPTER THREE

THE STANFORD SCALE ¹

Nomenclature — Record forms — Test material: its organization — Recording — Hints on giving the scale as a whole — Hints on single tests — Topical classification of tests

Nomenclature. In discussing this topic, the test series as a whole is alluded to in the text as the *scale*. The twelve *year levels* into which it is divided are spoken of as such. The word “test” is used to distinguish the six or more special divisions of each year level. The word “item” is used to distinguish special divisions of a test, as each of the absurd sentences in Test X-2. For brevity, each test is designated by a roman numeral for the year level where it occurs and an arabic numeral for its position in that year level.

Record forms. The original record form of the Stanford scale is the “booklet,” which consists of 12 pages, about letter size, including a summary of biographical data on the first page. It is still sold in large quantities and is purchased in envelopes containing 25 copies. It is useful where there is reason to make a detailed record of all or most responses. Such circumstances occur in the standardization of the scale and while learning the scale. The beginner should provide himself with perhaps a dozen booklets and record his first examinations fully upon them. The booklet is superfluous as soon as a fair degree of proficiency is reached, after which its use for purposes of immediate record is indeed questionable (13, 75-77).

The booklet being uneconomical for competent examiners, more condensed forms of recording have been sought. So far as the writer knows, there has never been in the market a record form quite satisfactory for the use of trained examiners. The only short form now in the market is the so-called “Abbreviated Record Filing Card,” which summarizes

¹ For a historical account, cf. 9 a, 81-103.

the items on a single page 8 × 10 inches (Houghton Mifflin Company). It is more serviceable when printed on a sheet instead of on a card. The experienced examiner can compensate for its technical imperfections without great effort.

In most of the expert applications of the scale the authorities have preferred to design their own forms. Nine such are in the writer's files. A 4-page letter-size form is the most convenient, to give room for the necessary text of the scale, for such recording of responses as desired, and for the examiner's comments on the case. Sometimes the form includes an abstract of tests devised by Kuhlmann for age levels below the Stanford range. The writer has always preferred a 1-page form. An early endeavor was made as represented on pages 34-35, giving a topical classification of the tests.¹ One advantage of a single-page form is its adaptability to the multigraph or other duplicating devices. If no special blanks are available, a convenient scheme of listing passes and failures for scoring performances is that shown on page 36.

The most economical text of a record form merits some consideration. It should, of course, list every test and provide space for scoring it. Beyond this it should quote just so much of the scale as will be a cue to the examiner, either for his memory or for recourse to the standard manual. Enough to identify a given test is uniformly necessary, and its separate items, if there are such. The need for giving more than this diminishes with the experience of the examiner. Statement of how many items must be accomplished (e.g., 3 of 4 or 3 of 5) is to be included where applicable. Long portions of material, like the memory sentences or the fables, have no place in a record form. The application of these principles in the writer's laboratory is illustrated on page 37.

¹On account of limitations of page size, it has been necessary to give two pages in this text to the reproduction of the form.

1. PERSONAL

...	iii.	1	Points to nose, eyes, mouth, hair
...	iii.	4	Gives sex
...	iii.	5	Gives last name
...	v.	A	Gives age
...	vi.	1	Shows r. hand, l. ear, r. eye
...	vii.	1	Fingers on r. hand, l. hand, both hands

2. OBJECTS AND MONEY

...	iii.	2	Knows key, penny, closed knife, watch, pencil
...	iv.	3	Counts 4 pennies
...	vi.	3	Counts 13 pennies
...	vi.	5	Knows nickel, penny, quarter, dime
...	viii.	A-1	Knows nickel, penny, quarter, dime, \$1, 0.50

3. TIME AND ORIENTATION

...	vi.	A	Morning or afternoon
...	vii.	A-1	Days of week (checks on T. T. S.)
...	ix.	1	Date
...	ix.	A-1	Months (checks on Apr., July, Nov.)

4. PERCEPTION

...	iv.	1	Compares lines
...	v.	2	Names colors
...	v.	1	Weights, 3-15, 15-3, 3-15
...	ix.	2	Weights, arrangement of

5. FORMS AND DELINEATIONS

...	iv.	2	Disc. forms, circle, square, triangle, etc.
...	iv.	4	Copies square
...	v.	5	Divided rectangle
...	vii.	4	Ties bow knot
...	vii.	6	Copies diamond
...	viii.	1	Ball and Field (infer.)
...	xii.	3	Ball and Field (super.)
...	viii.	A-2	Writes "See the little boy"
...	x.	3	Designs
...	x.	A-3	Healy A
...	xvi.	6	Code
...	xviii.	2	Binet's paper-cutting

6. PICTURES

...	iii.	3,	vii. 2, xii. 7, Dutch home, canoe, farmers, parlor
...	v.	3	Æsthetic comparison
...	vi.	2	Mutilated pictures

7. FIGURES FORWARD

...	iii.	A	641 — 352 — 837
...	iv.	6	4739 — 2854 — 7261
...	vii.	3	31759 — 42835 — 98176
...	x.	A-1	374859 — 521746
...	xiv.	A	2183439 — 9728475
...	xviii.	3	72534896 — 49853762 — 83795482

8. SENTENCE MEMORY

...	iii.	6	Dog — cat — sun
...	iv.	A	John — train — country
...	vi.	6	Mouse — fishing — hat
...	x.	A-2	Apple — cat — summer
...	xvi.	A-1	Grandmother — dog

9. FIGURES BACKWARD

...	vii.	A-2	283 — 427 — 958
...	ix.	4	6528 — 4937 — 8629
...	xii.	6	31879 — 69482 — 52961
...	xvi.	5	471952 — 583294 — 752638
...	xviii.	5	4162593 — 3826475 — 9452837

10. MEMORY

...	v.	6	Three commissions
...	x.	4	8 memories, 35 secs., 2 errors
...	xviii.	4	One of 2 passages

11. MATHEMATICS

...	viii.	2	Counts 20-0
...	ix.	3	10-4, 15-12, 25-4
...	ix.	A-2	Stamps
...	xiv.	5	Problems (1 min. each)
...	xiv.	6	Reversed clock, 6.22, 8.10, 2.46
...	xiv.	4	Enclosed boxes (30 secs. each)
...	xviii.	6	Ingenuity, 3 — 5 — 7, 5 — 7 — 8, 4 — 9 — 7

12. COMPREHENSION

...	iv.	5	Sleepy — cold — hungry
...	vi.	4	Raining — fire — miss car
...	viii.	3	Broken — school — hit
...	x.	5	Opinion — beginning — judge

13. REASONING

...	x.	2	Absurdities
...	xii.	5	Hercules — milkmaid
...	xvi.	2	
...	xiv.	2	Crow — stork — miller
...	xiv.	2	Induction
...	xiv.	4	Problems of fact
...	xvi.	A-2	Cannon — fish — mark

14. LINGUISTIC

...	ix.	6	Rhymes for day, mill, spring
...	ix.	5	Boy — river — ball, work — money — men, desert — rivers — lakes
...	x.	6	60 words
...	xii.	4	Dissected sentences

15. DIFFERENCES

...	vii.	5	Fly — butterfly, stone — egg, wood — glass
...	xiv.	3	President — king
...	xvi.	3	Laziness — idleness, evol. — revol., poverty — misery, char. — reput.

16. SIMILARITIES

...	viii.	4	Wood — coal, apple — peach, iron — silver, ship — automobile
...	xii.	8	Snake — cow — sparrow, book — teacher — newspaper, wool — cotton — leather, knife blade — penny — piece of wire, rose — potato — tree

17. DEFINITIONS

...	v.	4	Chair, horse, fork, doll, pencil, table
...	viii.	5	Balloon, tiger, football, soldier
...	xii.	2	Pity, revenge, charity, envy, justice

18. VOCABULARY

...	viii.	6	20 words
...	x.	1	30 words
...	xii.	1	40 words
...	xiv.	1	50 words
...	xvi.	1	65 words
...	xviii.	1	75 words

Name:..... Date:..... Time:.....

Conduct:.....

Mental Age	IQ

		1	2	3	4	5	6	a 1	a 2	a 3	MONTHS CREDIT PER YEAR
III	2										
IV	2										
V	2										
VI	2										
VII	2										
VIII	2										
IX	2										
X	2										
XII	3										
XIV	4										
XVI	5										
XVIII	6										
Total											

Scattering	
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BOSTON PSYCHOPATHIC HOSPITAL

PSYCHOLOGICAL LABORATORY I

SERIES 1

HOUSE

Name..... Birth-date..... Date..... Time..... O. P. D.
 Foreign Lang. Difficulty; None; Some; Marked. School grade..... at.....
 Occupation..... Willingness..... Effort..... Phys. Act..... Speech.....
 Mental Age..... I.Q..... Examiner.....

III-1. Nose, eyes, mouth, hair, 3 of 4
 2. Key, pen, knf, wtch, pcl. 3 of 5
 3. Pictures, enum. 3 obj in 1 pc.
 4. Sex. Correct 1st in qu.
 5. Last name
 6. Dog, cat, hot, 1 of 3
 a-1. Ff. 641, 352, 837, 1 of 3

IV-1. Compare lines, 3 of 3 or 5 of 6
 2. Disc. forms, 7 of 10
 3. Count 4 pennies, no err
 4. Copy square, pencil, 1 of 3
 5. Sleepy, cold, hungry, 2 of 3
 6. Ff. 4739, 2854, 7261, 1 of 3
 a-1. Jhn, trn, cntry, 1 of 3, 2 w 1 err

V-1. Compare weights, 2 of 3
 2. Colors, no err.
 3. Aesth. comp. no err
 4. Chr. hrs. frk, dll, pencil, tbl, 4 of 6
 5. Div. rectangle. 2 of 3, 1 min. ea.
 6. Key, door, box, no err.
 a-1. age

VI-1. r. hd., l. ear, r. eye, 3 of 3, 5 of 6
 2. Mutil. pict. 3 of 4
 3. Count 13 pennies, 1 of 2
 4. School, fire, car, 2 of 3
 5. 5, 1, 25, 10, 3 of 4
 6. Mouse, fishing, straw, 1 of 3, 2 w 1 err
 a-1. A.M., P. M. Correct 1st in qu.

VII-1. Fingers, no err
 2. Pict. desc. over $\frac{1}{2}$ desc. 2 of 3
 3. Ff. 31759, 42835, 98176, 1 of 3
 4. Bowknot, 1 min. sg. b. $\frac{1}{2}$ cr.
 5. Fly — butterfly, etc. 2 of 3
 6. Copy diamond, pen, 2 of 3
 a-1. Days week, no err, 2 of 3 cks.
 a-2. Fb. 283, 427, 958, 1 of 3

VIII-1. Ball & Field. Inf.
 2. Count 20-0. 40 secs. 1 err
 3. Broken, tardy, hit. 2 of 3
 4. Wood, coal, etc. 2 of 4
 5. Biln, tgr, ftbll, slidr, 2 of 4
 6. Vocab. 20 words
 a-1. 5, 1, 25, 10, 1.00, 50, no err.
 a-2. See the little boy, 1 min.

IX-1. Date, 3 ds err, d of m
 2. Arrange weights, 2 of 3
 3. 10-4, 15-12, 25-4, 2 of 3
 4. Fb. 6528-4937-8629. 1 of 3
 5. Boy, river, ball. 2 of 3, 1 min. ea.
 6. Day, mill, spring, 2 of 3, 1 min. ea.
 a-1. Months, 1 err, 2 of 3. cks. 15-20 sec
 a-2. Stamps, 15 secs.

X-1. Vocab. 30 words
 2. Absurdities, 4 of 5
 3. Designs, 10 secs. expos. $1\frac{1}{2}$ correct
 4. Rdg&rpt. 8 mem. 35 secs. 2 err in rd.
 5. Opinion, beginning, actions, 2 of 3
 6. 60 words, 3 min. (28 in 1 min.)
 a-1. Ff. 374859, 521746, 1 of 2
 a-2. Apple, cat, summer, 1 of 3, 2 w 1 err
 (a-3. Healy-A 3 in 5 min.)

XII-1. Vocab. 40 words
 2. Pity, rvg, char, envy, just. 3 of 5
 3. Ball & Field, Sup.
 4. Diss. sent. 2 of 3, 1 min. ea.
 5. Fables, Score 4
 6. Fb. 31879, 69482, 52961, 1 of 3
 7. Pct. interp. 3 of 4
 8. Snake, cow, sparrow, etc. 3 of 5

XIV-1. Vocab. 50 words
 2. Induction, No. and rule
 3. President and King, 2 of 3
 4. Problems of fact. 2 of 3
 5. \$300, pencils, cloth, 1 min. ea. 2 of 3
 6. 6:22, 8:08, 2:46, 2 of 3, 2 min.
 a-1. Ff. 2183439, 9728475, 1 of 2

XVI-1. Vocab. 65 words
 2. Fables, Score 8
 3. Laz-ldl, ev-rev, pov-mis, char-rep. 3 of 4
 4. Enc. boxes, 3 of 4, 30 secs. ea.
 5. Fb. 471952, 583294, 752638, 1 of 3
 6. Code, 6 min. 2 err.
 a-1. Grandmother, dog, 1 of 2
 a-2. Cannon, fish, mark, 2 of 3

XVIII-1. Vocab. 75 words
 2. Binet's paper cutting
 3. Ff. 72534896, 49853762, 83795482, 1 of 3
 4. Thought of passage heard. 1 of 2
 5. Fb. 4162593, 3826475, 9452837, 1 of 3
 6. 5-3-7, 5-7-8, 4-9-7, 2 of 3, 5 min. ea.

¹ Adapted from *The Measurement of Intelligence* (copyright, 1916, by L. M. Terman) by special permission of Houghton Mifflin Company.

Test material: its organization. Many separate pieces of material are required for giving the Stanford scale, and the competent student will soon strive for some systematic arrangement. It consists essentially of cards $7\frac{3}{4} \times 6$ inches. Some students prefer to mount the material on "master sheets" in a loose-leaf notebook, as photographs are often mounted. Others prefer to perforate the cards and bind them together with rings. Both these arrangements keep the cards in a fixed order, with the one wanted conveniently accessible. A notebook is more cumbrous, but keeps them in neater shape and allows them less chance to soil. A still simpler arrangement, and that preferred by the writer (cf. also 9, 15), is to index the cards numerically in order of year levels. They may then be fastened by a spring clip or carried in a portfolio of appropriate size. In this scheme, however, there is nothing to keep the cards from being disarranged and hard to locate. Its advantage is that it more readily permits removing a card and handing it singly to the subject, providing a more natural type of scrutiny than do the other methods. Under this scheme (also adapted to the other two methods) the test material may be arranged on about 25 cards of the size furnished by the publishers.

A dozen or more sheets of paper for Tests XIV-2 and XVIII-2 should be carried; also a copy of the record booklet. All the above material, and also "Healy A" if used, is carried conveniently in a heavy manila filing folder, one which is closed on two sides. The weights must be carried separately. A stop watch may be convenient, but an ordinary watch with second hand is sufficient.¹

¹ For psychometric work there are many advantages in that type of stop watch which is started and stopped by a side lever instead of from the stem, the side lever having a lateral movement without clicks. Mountings for stop watches, of cast iron, were devised by Dr. J. E. Anderson, at the Yale Psychological Laboratory. They safeguard against rough handling and mislaying.

Recording. The Stanford scale is an "all or none" series; that is, each test item is wholly passed or wholly failed. Only in a few instances is there any question of half credits. It is natural and customary to represent the passing or failing of an item by a plus or a minus sign. In working with persons of average or superior adult intelligence this is a drawback, as many understand these notations unless they are concealed. It is advantageous to use markings that do not have the conventional significance, such as $\checkmark$ for pass and $\surd$ for failure. Another notation may be made in this connection. When a test such as memory for six digits is passed, it is legitimate to assume that a test for a smaller number of digits will be passed. Also if such a test is failed, it may be fairly assumed that a test for a greater number of digits will be failed. One may then note such easier or harder tests as "constructively" passed or failed although they were not actually made. This is simply indicated by lining through the regular notation $\checkmark$ or $\surd$.

All computations for mental age and intelligence quotient are more conveniently made in terms of months. Only the final statement of mental age, if given, need be stated in years and months. One may also emphasize Terman's insistence on checking the correctness of arithmetic, for the best psychometric technique is valueless if computation is at fault. For convenience in computing final scores special tables have been prepared (21 and 21 a). A slide rule will probably perform these operations as efficiently, standard types of which have of course a multitude of other uses. A standard rule is recommended rather than the special "IQ" slide rules, and practiced mental examiners should know the rudiments of its use. The device is also convenient for computing fractional credits when an odd number of tests is given — seven in year 12, for example. The procedure

is simply to set the number of tests made on Scale C of the rule over the possible score in months on Scale D. This divides the latter by the former and gives under "1" on Scale C the number of months' credit per test. Under "number of tests passed" (Scale C) one finds the total months' credit for that year (on Scale D).

In his original work, Terman fixed upon the 16-year level as representing "average adult" mental age. On various grounds this has since been called into question. From the point of view of recording, there must be a definite practice in the matter of calculating the adult IQ. Terman, while not unmindful of the later findings, still recommends the use of 16 years (or 192 months) as the divisor. Others favor the use of 14 years. Serious confusion is possible through this duality of practice. Either can be well rationalized. The writer's office continues to use 16, figuring 87 as the average adult intelligence quotient.

It is desirable to have a heading for the record blank, carrying additional information needed to read the record. Besides the date, the subject's birth date and data on relation to the clinic, occupation, etc., may be included.¹ Such matters belong naturally to the discretion of the individual clinic.

The student must write enough of the response to enable the instructor to criticize his scoring; but there is no reason why an expert examiner should make for the separate test items any notes except passing or failing. Indeed, such pausing to write is contra-indicated both as a waste of time and a distraction or embarrassment of the subject. The evaluation of scores and description of the general test reaction properly wait until the close of the interview.

If a printed record form is used, the ball-and-field figure is generally printed from a plate; though with a single-sheet form it must be printed on the reverse side of the text, which

is wasteful. Where single duplicator sheets are used, as in the writer's office, the figure may be reproduced by means of a specially made rubber stamp, costing about \$1.25. The test is an important one, and it is better to draw the form if necessary, out of view of the subject, than to omit it.

Hints on giving the scale as a whole. Terman's *The Measurement of Intelligence* quotes copious sample answers for tests in terms of which one may gauge the value of the test responses given. The worth of these, both for examiners' ready reference and for teaching purposes, cannot be overstated. The student must learn to examine these carefully in deciding any doubtful scoring point. If the response is nearer those which pass, it passes, and vice versa. Even in advanced stages of practice the examiner should no more attempt to work without these than without test cards. The omission of these from the *Condensed Guide* (22) is a serious limitation on the value of this outwardly handy little volume. According to Terman, as well as from the writer's experience, somewhat more than an hour must be allowed for the examination of an adult. The time needed becomes less for less-developed minds; half an hour may be allowed at the lower limit of the scale.¹ Any suggestion, however, of testing against time is detrimental to good psychometric work. Mateer's suggested wall motto, "You have all the time there is," airily disregards the categorical imperative (How would it be if every one did like that?), but it does signify the best conditions. Children of equal intelligence will vary much in the amount of coaxing they require, as well as in the actual amount of testing which must be done with them. In the writer's experience, Terman's estimate allows very much less time than is requisite under conditions of clinical examination.

The minimum range of testing admitted by Terman is

¹ Gesell (47, 35) has, however, called attention to limitations of the Stanford scale at the 3-year level, on the ground of the small number of cases involved.

from a year level where all tests but one are passed to a year level where all tests but one are failed. He recommends the more customary rule of requiring passing and failing of all tests of these respective groups. Exception may suitably be made in the case of memory for digits. Passing or failing in these tests alone need not call for going through the year level just beyond.

The highest year level observed within and below which there are no failures is called the "basal year." Obviously this as a rule is also at the highest level where all tests are passed. Such a level being found, the subject may receive "constructive" credit for passing all tests below. Mateer favors determining the basal year rather late in the examination, that the subject may be at his freshest for the more difficult tests. On the other hand, if the determination of the basal year is left to the close, some psychotic subjects are so fatigued that they fail tests in year levels below what would otherwise be their base. The writer's experience on the whole favors determining the basal year early. The learner is likely to begin testing through one year level and then through another, etc., and from the standpoint of demonstration or instruction this is convenient also for the more experienced. It is, however, an uneconomical procedure for both sides. Most experienced examiners will agree with Mateer (17, 87-91) on the wisdom of giving the tests in certain logical groups rather than by year levels (cf. pages 34, 35). Mateer offers further suggestions on such a grouping. Only one point is really essential; namely, the giving together of all tests whose directions are the same, such as digits forward, digits backward, or the comprehension questions (though Terman questions how applicable are the norms in such a case). Giving the tests of these groups together saves tedious repetition of instructions and intellectual readjustment on the subject's part. It is necessary in this connection to refer

frequently backward and forward over large portions of the scale. The use of the "booklet" in this way is irksome, and the convenience of a single-page record form asserts itself strongly.

In nearly all cases it is wise, as Terman suggests (1, 130), to begin with tests as little as possible involved with language. In the lower half of the scale this is not hard to do. In the upper portions X-3, XII-3, XIV-2, and XVIII-2 may serve. The serial weights, IX-2, are perhaps the best all-round for the purpose.

Reading test material, such as the fables, to the subjects should be avoided, because the subject's attention is more liable to stray under it. It is likely to have less expression and be a less natural presentation than a colloquial repetition of the text from memory, *provided* the text has been well learned. There is considerable material which the first-class examiner may fairly be expected to cite from memory. It includes all the experimental material in the sentence memories, the comprehension questions, the fables, and a few other tests, principally as follows: III-6; IV-5; IV-a1; VI-4, 6; VII-5; VIII-3, 4; IX-5; X-2, 5, a2; XII-5, 8; XIV-4; XVI-2, a1; XVIII-4. The knowledge above implied may come of itself in the course of some fifty examinations.

The learner should not practice the Stanford or analogous scales without the standard manual open before him at the place where he is working. Students have a very understandable propensity to see what they can do without the book. The instructor must guard against this, because it is the direct route to false testing habits most difficult to overcome.

Hints on single tests. The following discussion does not make claim to exhaustiveness, for it is based essentially on a personal experience which is by no means equal for all parts of the scale. As such it is most concerned with questions

arising with adults of whatever psychometric level. Reference should also be had to Burt's comments (19, 70-72).

In respect to the pictures, Kuhlmann (13, 62-63) cautions against asking the questions in such a way as to elicit response of a level inferior to the subject's capability. (Cf. also 1, 190.) One should be sure in this test to elicit the most favorable response of which the subject is capable. The test is one that puts adults at a relative disadvantage (23, 408). The juvenile, with his freer imagination, is likely to express interpretation which the adult critically reserves. Indeed, with respect to these very pictures it has been argued on philosophical grounds that description is the highest form of response. Empirically, more developed minds are more likely to produce interpretations, at least within ordinary mental limits; hence the scoring policy seems justified. What must be guarded against is the inhibition of high-level response through uncomprehended questions. The questioning should be as flexible as is needed to bring out the utmost a subject can do. Not merely "Explain this picture," but "What does it represent?" "What is it all about?" "What seems to be going on?" are further stimuli to overcome one's misplaced criticism of response. Sometimes the issue of interpretation is raised without a specific interpretation being put forward. Such a response is fully credited.

The test of memory for digits (III-6, etc.) should be given through the successive year levels until failure is established, the same principle holding for other graded tests, such as those of "comprehension."

The card now furnished for the comparison of lines (IV-1) is not like that originally described by Terman, but presents a single pair of lines only. The three trials may be conveniently given by exhibiting the card first in normal position, then inverted, then on its side so that the lines are vertical.

The tests of counting pennies (IV-3, VI-3) are among

those where the organizers of tests seem to go out of their way to make things cumbrous. A very similar test can be made by presenting four or thirteen circles, outlined in black, about the size of a cent, sketched on the paper or on a standard card; and if the necessary pennies are not on hand, few will quarrel at this modification. In the earlier form of the test the Binet weights might be given for counting.

The Stanford scale having been organized for juveniles, many points of the phraseology appear grotesque for adults. Some allusion to this has already been made. It is sometimes simpler to ask the comprehension and other questions in the third person: "What should any one do when he has broken?" and so on. This avoids the personal reference implicit in the question, which is stronger for the adult than for the child. (Cf. the use of the doll's eyes, nose, mouth, etc., suggested by Terman (1, 112).) The sentences for repetition from memory are open to the same criticism. Those for year 16 are particularly incongruous and may, at least with intelligent adults, be reasonably replaced by others of equal length (see Chapter VIII, page 176). In some of the tests of sentence memory, each item contains two sentences (VI-6). If, as is natural, one drops his voice on closing the first sentence, the subject may spoil the item by beginning to repeat at once before the second sentence is given. This is avoided if one ends the first sentence with a rising inflection. In the same way one should indicate the close of a digit memory series by dropping the voice at the last digit.

In the æsthetic comparison (V-3) *nicer* may be understood where *prettier* is not. It is noteworthy that Terman, while sanctioning either comparative or superlative, says nothing about the positive degree. To the writer it seems at least as satisfactory.

When practicable, it may be permitted to substitute for

the rather elaborate bowknot procedure (VII-4) the expedient of having the child tie his shoe. Tying around the pencil has been suggested as not interfering with the examiner's hands. Terman objects to this as being awkward for the subject. The pencil can be secured against the difficulty of the string's falling out.

Another instance where the adult is penalized through his more critical tendency is afforded by the naming of differences and similarities (VII-5, VIII-4, XII-8). "The question, 'What is the difference between a fly and a butterfly?' " remarks Porteus, "is a much more difficult test for an entomologist than for a child, wholly because he conceives the question differently and may feel it necessary to give a scientific reply, whereas a child gives apparent differences, which are not universally true, but which are scored as correct" (42, 221). Practically, this consideration makes little trouble in the two early tests but is a serious drawback in the 12-year one, especially with adults. It is a question how far one is entitled to go with explanation where the information required is obviously present. Test VIII-4 often makes a serviceable introduction. There is also some room for choice of the item to begin with. *Snake, cow, sparrow* are seldom the clearest for this purpose. Ordinarily *rose, potato, tree* give the best introduction, followed by *knife-blade*, etc. With a man accustomed to mechanical work, the *knife-blade* item may come first. If the distinctions of vegetable and mineral are grasped, that of animal follows readily. The *wool* and *teacher* items seem more difficult.

The directions for the diamond (VII-6) call for pen and ink. With those who can write, the fountain pen should be a legitimate substitute. With others, the wisdom of the apparently cumbrous direction will make itself apparent. It would have conduced to less variable conditions to have devised a more complicated figure for drawing with pencil.

The instructions for the *digits backward* items may be made somewhat clearer by illustrating with an irregular sequence, such as 6-1-4, instead of 1-2-3 of the standard manual. It is better to begin with the three figures to be repeated backward and progress from there upward, no matter what the mental level of the subject. The subject must not be hurried with regard to this test, but allowed to take his time. One should especially observe Terman's admonition not to give this test next to *digits forward*.

Naming the days of the week and the months of the year are disproportionately easy for adults and should be avoided when the testing of an adult includes their range. The occasional modification of the ball-and-field test have already been commented on (page 28). One authority has modified the test to a square instead of a circular field. The idea was perhaps to avoid the thought of concentric circles, but it would seem to indicate parallel lines in a similar degree. It would be unwise to change the difficulty of the test without relocating it in the scale.

The first comprehension question of VIII-3 (page 28) has already been discussed. The third is also of a nature to require modification. A serviceable one to substitute for the problem is the situation of having one's foot trodden on in a crowded street car.

From the standpoint of diction it may be as well to make clear that the definition "in terms of use" also includes "in terms of function." Many simple definitions accepted under Test V-4 are accounts of activities rather than of use. In Test VIII-5 the most satisfactory criterion is a classifying noun, such as *bag*, *beast*, or *man*, followed by some modifying description. More elaborate descriptions, giving also functions, are acceptable even without the classifying noun. The examples should be carefully studied.

From the point of view of scoring, the essence of the vo-

cabulary test (VIII-6, etc.) is not a "complete" vocabulary, but the limits between which the known words fall. Only the learner need be expected to give the list from the beginning for the sake of experience in the rating of single responses. No more words need be given by the well-trained examiner than are necessary to determine the essential point. Examiners will vary on how easily they are satisfied in this matter, but more than fifteen carefully chosen words should seldom be needed to place the rating in the proper group.

It says much for the domination of the Stanford scale by linguistic factors that the vocabulary correlates so well with the scale as a whole. On the other hand, words are symbols of ideas, and the ability to handle words is the nearest approach to the handling of ideas. Terman identifies the handling of ideas rather closely with intelligence as such. "It probably requires more intelligence to tell what one ought to do in a situation which has to be imagined than to do the right thing when the real situation is encountered" (1, 159). (Cf. an interesting discussion of this point by Watts (24, 164-170).)

A dollar bill is to be substituted for the silver dollar (VIII-a 1) in regions where it is more familiar.

The question of the date (IX-1) should be avoided or at least not penalized with institution cases, as it is much more difficult for them than for the group for whom the test was standardized.

Adults do not commonly buy candy in 4- or 12-cent quantities, and it is more congruous to ask how many stamps one could buy. In this question (IX-3) one must not say "four stamps or 4 cents' worth of stamps," as 2-cent stamps are likely to be understood. "If I buy four 1-cent stamps and put down 10 cents to pay for them, how much . . .?" etc., is a convenient phraseology.

The third item of the absurdities (girl cuts herself in pieces) is inconvenient to give because it is answered "She couldn't," and then much cross-questioning is necessary to bring out why. It is best to reserve it to the last and omit it if the other responses are good.

The writer has elsewhere commented on the blood-lustful content of many of the items in the Stanford scale. For children this seems to be of no consequence. It is a genuinely disturbing factor with psychotic patients, for whom, to be sure, the scale was not organized.

Among the abstract terms to be defined (XII-2), *pity*, *revenge*, and *envy* seem the easiest and may appropriately be given before *charity* and *justice*.

In the instructions for the fables (XII-5, XVI-2) it is preferable to incorporate *moral* as well as *lesson*. With adults the personal reference is excluded by the omission of "us." One may even have to proceed more guardedly and say, "What lesson is it *supposed* to teach?"

It is possible to provide paper for the induction test which can be torn for the entire series of problems, obviating the need of scissors or knife. A suitable paper for this purpose is "railway manila," and this is also serviceable for rough drafts of manuscript and for carbon copy. Wherever this test is used it is wise to precede it with Binet's paper-cutting test (XVIII-2), as this latter may not be used if the induction test has preceded.

The president-and-king test (XIV-3) has become more and more unsatisfactory with the course of history since the Stanford scale was organized. It may reasonably be replaced by the alternate, although this has itself an objectionable feature in the repetition of digits in each series.

The third item in Test XIV-4, problems of fact, has been called into question on account of the less frequent use of

the bicycle. A more contemporary answer that is difficult to reject is "kiddie-kar."¹

In the reversed-clock test (XIV-6) it is better not to question whether the subject can visualize the hands, but assure him that he can do so and proceed with the test. As already brought out, one should avoid asking whether the subject can perform the essential task, as this opens an easy evasion through denial. He should simply be instructed to perform the test described. From the point of view of grammar, the appropriate mood of the examiner is the imperative.

In the hard differences (XVI-3) the evolution-revolution item is so much more difficult than the others, almost in the nature of a conundrum, that it is best to reserve it until the last. Seldom, indeed, will it be got by one who has failed another item of this test.

The code test (XVI-6) embodies a well-tried psychometric principle but in a rather questionable form. No definite time limit for the presentation is set. For its value in the scale, it takes disproportionately long to administer. It may be instructively compared with the use of the same principle in the Kuhlmann scale (*q. v.*, page 91).

In the paper-cutting test (XVIII-2) the writer has uniformly used a sheet of letter-size paper instead of the sheet about 6 inches square described by Terman. It is always better to avoid odd material when standard material is so readily available. If a square sheet of paper is used, one must take more care that the holes are not located at the wrong axis. With a letter-size sheet, make the first fold at right angles to the long axis and then at right angles to the first fold; the holes will always be on the long axis. The in-

¹ For the second item of this test one may, with adults, properly diminish the personal reference by asking what "seems to have happened" there. In this question a negro soldier is reported to have made a forcible appeal to the law of parsimony, with the deduction that the neighbor was maintaining a house of ill fame.

struction to "show what results from the cutting" is perhaps disadvantageous to those whose mental imagery exceeds their language ability. "Show how this will look," indicating the cutting, seems to be more readily comprehended.

The second paragraph for logical memory (XVIII-4) appears to be much easier than the first. If the second cannot be satisfactorily accomplished, it is extremely unlikely the first will be.

The use of pints as a unit of measurement in the ingenuity test (XVIII-6) is incongruous, and the problem is more naturally presented in terms of quarts. Many subjects make the change of their own accord. It is almost always necessary to give further explanation in regard to "guessing." If a subject has not completed a second step in the solution at the end of two minutes, injustice will rarely be done by scoring a failure.

Topical classification of tests. In addition to standard numerical scores and the description of the general test reaction, it is often desirable to observe performance in more special ways. As a guide to doing this along the lines mentioned on page 9, the following suggestions are offered:

Speed of response. Consider especially Tests III-2, 4, 5; IV-3; V-2, 3; VI-3, 5; VII-4; VIII-2, a 1; IX-3; X-6; XII-4; XIV-5, 6; XVI-4; chiefly those tests involving simple and controlled responses.

- A Notably quick and alert. At mental age can make responses as above in less than two seconds.
- B Simple responses at mental age made in two to five seconds. A fairly prompt command over the range of knowledge present.
- C Slower than normal in simple responses at mental age. Such responses take from five to fifteen seconds after initial presentation.

D Retarded; exceeds time limits on tests finally accomplished correctly or shows very marked delay in general responses.

Vocabulary. Consider Tests VIII-6; X-1; XII-1; XIV-1; XVI-1; XVIII-1.

A Test age two or more year levels above mental age.

B Test age less than two year levels above mental age.

C Test age less than two year levels below mental age.

D Test age two or more year levels below mental age.

The grade BC is assignable when the test age is within six months of the general mental age.

Memory. Consider Tests III-6, A1; IV-6, A1; VI-6; VII-3, A2; IX-4; X-4, A1, A2; XII-6; XIV-A1; XVI-5, 6, A1; XVIII-3, 4, 5.

Imagery. Consider Tests X-3; XIV-6; XVI-4, 6; XVIII-2.

Comparisons. Consider Tests VII-5; VIII-4; XII-8; XIV-3; XVI-3.

Reasoning (Arithmetical). Consider Tests IX-3, A2; XIV-2, 5; XVIII-6.

Comprehension. Consider Tests IV-5; VI-4; VIII-3; X-5.

Practical judgment. Consider Tests VIII-1; IX-2; XII-3.

Ideational judgment. Consider Tests X-2; XII-5; XIV-4; XVI-2.

Sensation. Consider Tests IV-1, 2; V-1, 2; IX-2.

Perception of form. Consider Tests IV-2, 4; V-5; VII-6; X-A3.

REVIEW QUESTIONS AND EXERCISES

1. Have the students systematically arrange their material for the Stanford scale, and inspect and criticize arrangements.
2. Students should have not less than an hour's classroom drill with a 10-inch Mannheim slide rule, illustrating proportion, multiplication, division, computation of intelligence quotients, and computation of months' credit where an odd number of tests is made.
3. What special point is involved in the adult intelligence quotient by the Stanford scale?
4. Discuss the order in which the tests forming an examination should be given, including relation to the basal year.
5. Compare, with respect to children and adults, the giving of the following tests: pictures, comprehension, ball and field.
6. Practice giving digits with proper speed and inflection.
7. Learn to give from memory and with expression the material of the following tests: III-6, IV-5, IV-A1, VI-4, VI-6, VII-5, VIII-3, VIII-4, IX-5, X-2, X-5, X-A2, XII-5, XII-8, XIV-4, XVI-2, XVI-A1.

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CHAPTER FOUR

PROPERTIES OF INTELLIGENCE TESTS

General meaning of scores — The average adult test level — Social status — Scatter — The point scale — Short scales — Test ratings and the diagnosis of feeble-mindedness

General meaning of scores. An intelligence score is valuable in so far as it enables one to predict what an individual's level will be. It is well known to workers in clinical psychometrics that high intelligence scores are no guarantee of mental balance (26). But if a certain degree of the quality measured by intelligence tests is not present, one may look for difficulties of adjustment on the score of this deficiency. Where the line is drawn depends much on the social milieu. An individual will "float" in a simple rural environment who would go on the rocks in the keener urban struggle for existence. An adult who can never be self-supporting may well make a normal appearance through an independent income watched over by competent trustees. Kuhlmann (13) and Porteus (42) have both emphasized this "social criterion" of feeble-mindedness. L. S. Hollingworth, on the other hand, regards these same considerations as objections to the social criterion of feeble-mindedness (cf. 18, 44).

Pintner (8, 76-77) distinguishes seven grades of intelligence-quotient rating, the line of feeble-mindedness being placed by him at 69; that is, an intelligence quotient lower than 70 casts its vote for feeble-mindedness; few would allow it to be decisive in the question. Intelligence quotients of 130 and over form a "very superior" group. Intermediate grades are termed by him, respectively, borderline, backward, normal, bright, very bright. The "normal" group occupies a mental range from 90 to 110. From the point of view of nomenclature, "normal" probably means a wider range to most people; "supernormal" and "subnormal," greater

variations. Strictly speaking, average is to the normal as a point is to a line or as a line is to a zone, but hardly so narrow a zone as is denoted by the IQ range from 90 to 110. Names are commonly attached to three grades of feeble-mindedness: upper or moron, middle or imbecile, lower or idiot (24, 170 ff.; 8, 177 ff.; 13, 16).

When a person is placed in any of these categories, the postulate is at least tacitly made that the IQ on which it is based is constant, at least within practical limits. In the beginning of psychometric work this could be only a hypothesis, but systematic data have accumulated to justify it in general.

Baldwin and Stecher (26 a) call attention to considerable changes in rating with occasional individuals. Theoretically this could be a result of actual acceleration or retardation in mental growth¹ or an incidental variation in response to tests. Many factors of the latter have been discussed, notably by Lincoln (25). Practically, it seems safe to discount it in the hands of competent examiners. Mateer (26) has made a study of fluctuating IQ's with a smaller and more individually observed group of children suggesting cyclical disturbances.

An elaborate investigation of the point, extending over a decade, is reported by Kuhlmann (27), dealing with defectives. Here it would seem that intelligence growth is retarded somewhat in proportion to the mental deficiency first observed; the lower grades cease to develop earlier than the upper. In above-average cases, on the other hand, he reports an exaggerated mental development — increase of IQ instead of the decrease observed in the lower grades.

Doll (28) emphasizes the cognate point that intelligence quotients cannot be given the place in mental status that

¹ With reference to this topic, cf. Burt (19, 151-159); also Freeman (9 a, 329-357).

mental age can be given. In making immediate comparisons or classifications of children, mental age is more serviceable than IQ because it is statement of intelligence level already reached; the IQ is essentially a derivative of this for the purposes of prediction. In a more extensive study, Doll (29) further develops his conservative attitude toward the IQ. Summarizing the literature, and from observed fluctuations graphically illustrated, he concludes that the average annual rate of intelligence growth is not closely bound up with any mental-age level that happens to be observed. This annual increment becomes, generally, smaller and smaller as life age increases, reaching a minimum at about 13 years. One must be very guarded in making prediction based on approximate constancy of IQ. Terman (29 a, 330) vigorously defends his original position on these points, criticizing Doll and Wallin; while Lincoln (29 b) in rejoinder supports the findings of the army work with respect to average adult test level.

Terman (1, 71) observes a slight general superiority (amounting to an average of 1 per cent) in girls' scores up to the age of 13, the following year showing the boys higher. In most comparisons of adult groups men have averaged slightly higher. The criticism is pertinent, however, that the tests used have been largely designed by men, and thus tended to favor tasks in which they excelled. In this connection, Terman found certain tests of his scale to favor boys and others girls, as follows:

BOYS BETTER

Arithmetical reasoning
 President and king
 Form board
 Making change
 Reversed clock
 Similarities
 Induction

GIRLS BETTER

Designs from memory
 Æsthetic comparison
 Comparison, objects from memory
 Comprehension
 Digits and sentence memory
 Bowknot
 Rhymes

A more comprehensive table, showing the relation of sex to the difficulty of various tests of the Binet and allied series, is given by Burt (19, 194). The tests in which Terman's girls excelled involve rather formal mental functions, whereas in the boys' group are found those of the more complicated reasoning processes. At the same time the tests in the girls' group come generally earlier in the scale than those in the boys' group, and the difference may be related to the early general superiority of the girls offset in the later years.

The average adult test level. This was posited by Terman at 16 years, but field experience with the scale soon called this standard into question. The first published doubt about it was through Terman's (30) own work with prospective policemen and firemen showing an average IQ of 89, equivalent to about a 14-year test level. In this connection Pressey and Cole directed attention to the maladaptation of many of the tests for adults, tending to make them score too low. Data gathered in the course of psychometric work with the army indicated an adult test level distinctly lower than originally thought. The chief body of data available from this source indicates an average test level between 13 and 14 years. This, however, is subject to some reservations, partly because of the special and relatively disturbing conditions under which the tests were made (Kohs, Mateer) and partly because of selectional factors that may have excluded a disproportionate number of persons rating high. Kohs (14, 236-262) has offered very strong opposition to accepting the army data on these grounds. Murchison has more recently expressed a similar view (59). Doll (32) supplemented the army findings with data on public school children in whom increase in score above 13 years was not observed, and reported a similar situation with delinquents and feeble-minded juveniles. Kuhlmann (13, 82), on the other hand, considers

that these capacities normally develop to about 15 years, and his data already cited would lead one to question whether it is valid to adopt data of subnormal individuals as to the age at which these functions cease to develop. In spite of points brought forward by Kohs, there is good authority for using 14 or $14\frac{1}{2}$ years instead of 16 years as the divisor for adult intelligence quotients (W. F. Dearborn, Pintner). The writer's personal examining experience does not indicate that the average adult score reaches the 16-year level. Persons who reach these levels are, independently of psychotic interferences, clearly superior to average in educational attainments and general evidence of mental capacity. It is believed that one gets a fairer picture from the point of view of clinical management if one regards a 14-year performance as average adult. If in calculation one divides by 16, this means an average adult IQ of 87. The practice of dividing by 14 seems technically justified, but it is confusing to those accustomed to the standard practice. (Cf. also 32 *a.*)

In treating the average adult IQ one should keep separate the question of how many years the intelligence continues to grow and the height it reaches. For practical purposes, however, the average score may be taken at 14 in the use of the Stanford tests or psychometric equivalent. The facts on intelligence growth can scarcely be found save through long experience of retesting large numbers through periods of years. The indications are, as would be expected, that low intelligence ceases to develop early (Kuhlmann) and that high intelligence continues to develop longer (Thorndike) outside the limits of 14 and 16 years, about which the discussion of the average is centered. Hollingworth reviews examinations of soldiers (33, 193) having nervous disturbances whose responses seemed comparable with those of normal individuals for the present purposes. He observed fifteen different age groups ranging from "below 20" to 45.

While the Stanford scale itself is not considered, the results give no reason to suppose that the scores would increase from the period of early adult life (cf. also 9 *a*, 357-364).

Social status. Yerkes and Anderson were among the first in this country to call attention to superior test rating by children of superior social status. Similar findings have been reported by Terman in the original work on the Stanford scale. English (34) carried on work with various tests not forming part of a standard psychometric scale, showing superiority of the better social class in all save tests of rapid movement. Arlitt (35) found analogous results with the Binet scale slightly complicated by race differences. Studies were reported by L. C. Pressey and H. B. Alexander which confirm this earlier work. Pressey and English consider that heredity is a dominant factor in these results; Alexander appears to lay more stress on environment. Burt discusses the question further from the standpoint of individual tests in the scale and reports detailed findings as to their relation with superior and inferior environment (19, 194-196; cf. also 9 *a*, 444-475).

Hornell Hart (36) has recently studied the relation of test level to the fertility of occupational groups. The greater fertility of lower occupational groups brings about a slight tendency for the general test rating to decline in the succeeding generations. A similar point is made by Brigham (37, 197-210).

In the main the high test ratings of the upper social classes express one aspect of the qualities that have brought them to upper social levels. Other things being equal, the more intelligent persons will raise their social status. Their children will profit by more favorable environment, as well as by inheritance, although the relative importance of these is still at a speculative stage.

L. S. Hollingworth has forcibly criticized the concepts of norms for the various social classes (18, 15): "It has even

been suggested that we should obtain norms for the various social classes, as though all could not be related to one norm for the population chosen at random. If carried out to its logical conclusion, this would mean that by measuring the inmates of schools for the feeble-minded, we might obtain a norm which would be applicable to such inmates, on the basis of which they could then be classified as 'normal.' The concept appears analogous to the better-understood relations between test rating and occupational level. A man with an IQ of 60 is more likely to be a laborer than a university professor or the head of a political machine, with the differences of social milieu that these distinctions imply. The idea of norms for social status is more assimilable in a caste system of society than in one with democratic institutions. In the latter case the intelligence level is of importance simply as a factor in the occupational level in which he will adjust himself and the social consequences thereof.

Scatter. It is inherent in the organization of a scale like the Stanford that one passes and fails tests through a number of year levels before the required range of testing is covered (1, 148). The extent to which a test thus "tapers off" is spoken of as irregularity or "scatter." Binet, working with the original series of age-level tests, recognized this scatter as well as its essential significance (38, 27). The first systematic work published on it seems to be by Pressey and Cole (39 and 40) and by Curtis (41). Their work was mostly with the point scale, but is easily comparable. As observed by Binet, less scattering is seen in feeble-mindedness than in psychotic cases, and scattering is especially marked in chronic alcoholism. They reach the pertinent generalization that scatter denotes the presence of some interfering factor that limits the reliability of the score as indicated. Pressey later reached similar conclusions through the medium of the Stanford scale. Curtis also observed similar situations, finding

scattering especially marked in syphilitic cases. The substance of these findings was confirmed by Wells and Kelley (20, 20-22), with special reference to the organic side.

Porteus (42, 203 ff.), though he appears to have found more scattering in psychopathic than normal individuals, is conservative about the practical application of the symptom, questioning the criterion suggested by Mateer on this point and taking a position more in accord with Wallin. It is here not so much a question of general tendency to scatter, on which there seems to be agreement, as on its usefulness in forming a judgment of the case. Porteus reports statistical material that rather supports his more conservative attitude. More recently Mateer goes farther into the question but hardly regards the criterion (successes in more than 4 years above basal year) as more than tentative (17, 172-175). The writer has seen scatter so marked in normal children as to lay little stress on it as a pathological sign. With psychotic adults the situation is somewhat clearer. Scattering over five or more year levels, including the basal year, may fairly raise the question of organic or toxic involvement. Regular performance does not exclude it.

Scatter in the Stanford scale may be evaluated in various ways. One may count the number of tests passed above and failed below mental age, or one may, with Pressey (40), weigh the scattering tests according to their distance from the mental age. The simplest is that previously noted — the number of year levels necessary to cover for the required range (it should be clear whether or not the basal year is included). It has hardly been shown as yet that the more elaborate methods have commensurate advantage. The scatter is a minor symptom only and must be taken with reference to the other facts in the case.

The point scale. In 1915 there appeared under the authorship of Yerkes, Bridges, and Hardwick an adaptation of the

tests used in the Binet series, with some additional tests, known as the "point scale" (9). It was adapted to the same general purposes for which the Binet series was intended. The discussion as to the relative merits of year-scale and point-scale measurement has been not wholly free from special pleading. Outstanding differences are not likely to exist between two measurements of "intelligence" which correlate .87 (9, 14). Nevertheless, the mutual criticism is worth reviewing.

From the point of view of experimental psychology the point scale seems to have paid more attention to the details of test construction, but cf. Watts (24, 161). It is shorter, which means not only that it takes less time to give but that it is more easily learned with thoroughness. The same tests being continually used, one does not become well practiced on one part of the scale and rusty on another, as in the Stanford. In certain of these advantages there are corresponding limitations. The scale originally devised (adolescent-adult) proved relatively unserviceable for normal adults. A separate adult scale was devised and also one adapted to children of pre-school age (infants' scale). These three successive scales make a rather cumbrous instrument beside the homogeneous Stanford, which ranges, though with varying accuracy of standardization, from three to superior adult years. With it one would have a larger number of tasks suited to the mental level of the subject than with the usual point scale. This feature is stressed in favor of the Stanford scale by Pintner (8, 108), while Yerkes speaks of the uniformity of the tests in the point scale as advantageous to the latter (9, 8).

Yerkes (9, 158) deprecates the absence in the year scale of responses receiving credit in the several experimental tasks for the successive years. This is almost inherent in year-scale organization, for it would be difficult to standardize most

tests — memory for digits, for example — by successive year levels. It is indeed Terman's intention to vary the experimental tasks widely (1, 134).

The main difference between year-scale and point-scale conceptions is one hardly denoted by the names. The Stanford scale is itself a point scale, whose points are represented by credits in months. The principal issue between them is represented in their methods of scoring. The Stanford scale scores each item "all or none." Each item must uniformly be accomplished on a definite level or it gets no credit; nor is extra credit allowed for doing it much better than is called for. It makes no difference how perfectly the designs of Test X-3 are reproduced nor how philosophically the terms of Test XVI-3 are contrasted. Each is good for but two months' and five months' credit, respectively. In the point scale, on the other hand, the subject scores 1, 2, 3, or more points on the basis of how much of each item he accomplished; thus for explaining each of a series of six "analogies" the subject receives 1 point for each analogy completed. The "vocabulary" utilizes this principle in the Stanford scale. Terman freely concedes that success by repeating all three of five digits is different from success by repeating only one (1, 133), but it does not enter into the Stanford scoring. It is noticeable that the record booklet calls for several items of information that do not affect the score.

From a theoretical standpoint, the point scale has rather the better of the argument on this issue. One can scarcely follow Binet when he says (38, 244): "It is characteristic in the losses of functioning that the subject knows how to do the problem submitted to him; he has the knowledge, but from time to time the power fails him." Or again (38, 252): "But notice that this woman knew very well how to count backwards, since she finally succeeded; it is not therefore the knowledge that is lacking, but the comprehension of what is

asked of her. All this is a remarkable example of inertia of comprehension." Kuhlmann (13, 26) goes on to say: "Suppose B, for example, to be just unable to repeat five numerals. It would not matter much how many trials he were given, he would fail in all if he were really incapable of performing this task. Suppose A, on the other hand, to be just capable of repeating five numerals. It would not matter how many trials he were given, he would pass in most and fail only as his effort or other condition varies, for what he can do once, he can do again and any number of times." And from this it follows that "A few failures do not count if in one or more successes he proves himself capable of doing the task set" (13, 70). This is in effect to say that a person who distinguishes a difference of four tuning-fork vibrations in seventy out of a hundred cases has as good an ear for pitch as one who distinguishes them ninety times out of a hundred. Few experimental psychologists would sponsor such a view. It is certain that a person will be able at one time to repeat six digits and at another not, while another will get six digits without fail. It is inadmissible to say that there is no memory difference. True, it is not essential that A, who succeeds in all three trials, be given three times as many credits as B, who passed it only once. That is a question which may be settled empirically on the basis of how much harder it is to get two or three than one and how it checks up with the record in general. Theoretically, it might be half again as hard; it might be five times as hard; few will say it is no harder.

As Yerkes expresses it, the year scale implicitly assumes "appearing" functions; the point scale, "developing" functions. In general the latter principle is preferable, though it might be questioned if we know enough of genetic psychology to say that there are no such critical levels of development, during which functions would develop so rapidly

that some of them might be said to "appear" (13, 408). Puberty offers an analogy. A wide range of functions is also implicit in the Stanford scale, with its greater total number of tests. Does one get a better picture by tracing the development of different functions experimentally measurable, as in the point scale, or by covering a wider field in a less systematic manner? So far as general scores are concerned, there is no great difference. Most workers seem to have been impressed by the advantages of the year-scale principle (e.g., Mateer, Kuhlmann, Pintner); an opposite position is taken by Coxe (43) and to some extent by Freeman (9 a, 131-135). The forensic factor has probably some part in the year scale's more rapid spread. The "mental age" concept arises more naturally out of the year scale and takes better hold on the imagination than a score in points requiring translation into age units.

Short scales. There is evidence that from the point of view of an intelligence score, conventional scales are longer than necessary; that is, a selection of the tests contained in them yields scores *practically* as significant as the entire series. This point was first made by Doll (44), who constructed from the Goddard Revision of the Binet Scale two brief scales, each including two tests from each year. These brief scales were found to show close correspondence with the complete scale, although they were subject to certain constant deviations for which correction could be made. The brief scale preferred of the two contained the tests regularly more difficult for defectives, and it was thought that the exaggeration of defect thus produced would prove a useful factor in its early recognition. He also offered an abbreviation of the Stanford scale, then just introduced.

Following this lead, other abbreviations of the Stanford scale have been made, one according to Terman himself and others arising under military auspices (23, 407). These ab-

breviations each used four tests per year, credits being adjusted proportionately. The "Terman Short Stanford" includes tests rather of ideational content; the "Army Short Stanford" favors tests of concrete accomplishment so far as the content of the Stanford scale makes this possible.

The Stanford scale was also abbreviated for certain purposes in military use to two tests per year. A brief scale was organized which correlated .95 with the full scale up to the mental age of 9 years, but beyond this was not serviceable (23, 410). An abbreviated form of the Yerkes point scale containing nine tests was also organized and showed substantially the same correlation with the longer form. Levy (45) describes a brief series of accomplishments not obviously mental tests, which can be made in not more than four minutes and under many conditions where more elaborate testing is impossible. Correlation with Stanford of .95 is reported. The method is adaptable to mental ages between 5 and 11.

A further study of this principle is reported by Hansen and Ream (46 a) working with group tests, who found that conventional test series requiring half an hour or more for administration could be shortened to fifteen minutes without lessening their value for predicting school success.

Doll himself called attention to the limitations of short-scale practice: "The more complete measuring scales of intelligence furnish a much greater variety of standard situations in which the subject may be caused to display his mental abilities to the trained observer. The results of the more extended examination are more satisfactory by reason of the more elaborate consideration of more phases of the subject's intelligence, and rule out the possibility of invalidation due to exceptional circumstances of environment or education. The chief consideration is that the gross mental ages and the resulting gross intelligence classifications obtained by use of the

brief scales are practically the same as those obtained by the more extended scales" (44, 211). These and other considerations of a statistical character justify the fact that in examining practice the abbreviations have not come into very wide use.

In this connection mention should be made of the "Diagnostic score" cited by Porteus (42, 197-201), though this authority specifically disclaims it as an equivalent of mental-age rating. This measure consists of eight tests of the Stanford scale credited by a special system. The score is in terms of years and months and is thought to bear a somewhat closer relation to social adaptability than does the intelligence rating. The critical level of the score cited for feeble-mindedness, 11 years, is one above which most examiners would be extremely guarded in speaking of feeble-mindedness for any case.

Similar in external construction, although not in conception, is an abbreviated series of ten tests from the Stanford scale described by Lincoln and Cowdery (23, 410-411). "If a subject passes all the tests, it is practically certain that his mental age is above 10.5 years."

Test ratings and the diagnosis of feeble-mindedness. The term "feeble-mindedness" as such would not restrict the feebleness to any phase of the mind to the exclusion of others. From this point of view one is justified in regarding feeble-mindedness as a deficiency in general adaptation, as does the report of the British Royal Commission. On the other hand, greater susceptibility to quantitative statement has led to a conception of feeble-mindedness rather in terms of intelligence-test score. In the former case the test rating carries less weight. The writer recalls a diagnosis of feeble-mindedness made in the presence of an IQ of 108. If one may speak, with Thorndike, of abstract and social intelligence, one should also be able to speak of intellectual feeble-minded-

ness and social feeble-mindedness, or feeble-mindedness in other functions of the mind, as the emotional.

Burt (19, 143-144) gives a table showing differences in relative difficulty of various Stanford tests for normal and defective individuals, classifies these psychologically, and discusses their relation to the English educational system. The tendency from the psychometric standpoint, according to L. S. Hollingworth (18, 52), is toward conceiving feeble-mindedness as denoted by an IQ rating of 70 or less and falling within the lowest 2 per cent of the ratings of the population. There is, however, some question as to the consistency of these terms. According to army data, 2 per cent of the white draft have a mental age of not more than 8 years (23, 789; 8, 223). This would give an IQ of not more than 50 as synonymous with the lowest 2 per cent of adults (cf. also 9 a, 363-364). For reasons cited above, this figure may be too low, but satisfactory social adjustments are commonly observed with mental-age scores of 9 years and corresponding to adult IQ rating of the order of 55. Points raised by Wallin (46) and by Kohs (14, 182) are significant in this connection (cf. also 9 a, 296-303). Burt suggests 8 years mental age as a lower limit for extra-institutional life. From an educational standpoint, he looks upon IQ's of 50-60 as indicating extra-institutional supervision, and 60-70 special classes (19, 160-174).

As a matter of formulation, the present writer would favor the classification of feeble-mindedness where the person's inability to meet the demands of his environment arises in the main from defective intelligence, in the psychometric conception of the term. Whether the defective intelligence arises through congenital, traumatic, or toxic causes is more or less academic (for the classification of feeble-mindedness), save that the cause is generally assumed to be present from birth or very early years, and a distinction from deterioration

should be made. Behavior inadequate to the demands of the environment arising in other ways, as unbalanced emotional or instinctive life, intoxication, or diseases of the nervous system, is covered in other not less definite diagnostic classifications (psychoses, psychopathic personalities, the "original disease states" of Kraepelin). From the point of view of case management, it is sometimes in the interest of the patient to assign the classification of feeble-mindedness rather than others independently of the above conceptions, perhaps inconsistently with any conception that can at present be laid down.

REVIEW QUESTIONS AND EXERCISES

1. Discuss the number of intelligence levels that may profitably be distinguished.
2. What is the difference between "average" and "normal"?
3. What are some of the findings with regard to the constancy of the IQ through succeeding years of growth?
4. Discuss the divergent opinions on the average adult intelligence level as indicated by the Army data.
5. What considerations appear concerning the relation of intelligence to social status?
6. How may scattering in the Stanford scale be measured, and what does it mean?
7. Compare the year-scale and the point-scale systems.
8. How far is it possible to shorten the time required for a full Stanford and still get a serviceable intelligence score?
9. How is intelligence in its ordinary conception related to the qualities measured in "intelligence" tests?
10. Show by charts (projection apparatus) some of the principal statistics on the distribution of intelligence.
11. Exhibit sample tests distinctive of the point scale.
12. Students should now be able to undertake the Stanford scale with simple cases, recording responses in fair detail. Work of this nature should continue, with gradually diminishing supervision, throughout the course.

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CLINICAL MATERIAL WITH SPECIAL REFERENCE TO
INTELLIGENCE LEVEL

NOTE. The case abstracts presented here and subsequently are extremely condensed, except with reference to the psychometric work. They are designed to indicate what psychometric work was done, why it was done, and the part the results bore in the interpretation of the case. Identifying data are disguised. Some follow-up material is included in most cases, but was not obtainable in others. Special attention is asked to the fact that the cases were selected on the basis of psychometric records, and in very few instances was the history at all known to the writer at the time when the cases were selected for inclusion. The type of problems presented should, therefore, be a fair cross-section of the problems with which the psychometric work of an institution like the present has to deal, save for some emphasis on cases where legal questions were involved. It is noteworthy that a relatively small part is played in them by the more distinctive psychiatric disease forms.

Case I. A girl of 12 years, 3 months, the third of four living children, in the fourth grade of school, recent truancy. She is referred by a social agency on account of sex misdemeanors with boys, not amounting to intercourse; other girls also involved; a group problem. During the psychometric examination she was sluggish in test response and in general behavior, talked little, but showed no trace of embarrassment. The Stanford basal year was VIII, the patient passing five tests in year IX, one in X, and three in XII, including the ball-and-field. This yields a mental age of $9\frac{9}{12}$; IQ 80. The age scored in the Porteus mazes was $9\frac{1}{2}$; in the Healy Picture Completion Test I, 9-10; in the Dearborn Formboard No. 4, $8\frac{1}{2}$. The psychometric picture is thus one of retardation fairly consistent in ideational and "performance" fields. Whitman's Test of Manual Dexterity places her in the lowest quartile for her age, but lack of manual training is to be considered here.

The patient's home is in an inferior neighborhood. The economic status is marginal. The mother is the sole breadwinner, the father being inefficient. In general the patient is amenable to mother's discipline, appears affectionate, somewhat impulsive. Adequate home supervision is impracticable. The difficulties are well accounted for by the domestic situation acting upon the subaverage mentality of the patient. Intelligence level is borderline, not in itself inadequate to ultimate self-support, but excluding the schools for feeble-minded which would offer the best solution. She can learn

ordinary household tasks and would respond well to a home that could give her more training. Recommendation for a foster home with this in view.

Case II. A boy aged 10 years, 2 months; no record of other living children. Home broken up, father having deserted (temporarily). Came first to clinical attention at 4 years, thought to be defective. Overactive, disobedient, said to have been "spoiled." Boy is now in the fourth school grade. Referred by court on a charge of stealing a bicycle; several delinquencies of this order.

Has considerable psychometric history; record of five Stanford examinations showing life ages and IQ's, as follows:

LIFE AGE	IQ
4 years 0 months	100
5 years 5 months	73
6 years 3 months	84
7 years 2 months	90
10 years 2 months (present)	95

In the present test was willing but quite distractible and impulsive. Much scatter; basal year 8, passing similarities in year 12. Age score in Porteus mazes 11 years, regular; maximal score in Healy PC-I. Adult scores in triangle and diagonal. Good learning in construction puzzle tests. Interview disclosed an overactive boy, restless, distractible, imaginative, much fantasy life. Impulsive, not modified by usual moral inhibitions. No proper outlet for overactivity. Apparently no instinctive conflicts of importance. Recommended foster home in country, affording good motor outlets.

Ran away four or five times from foster homes; adventure rather than discontent, also influence of another boy. Finally a more permanent adjustment, assisted by a school teacher, an old acquaintance; school and physical improvement. Meanwhile the home had been reorganized and improved to such an extent that return was advised and carried out.

Case III. A boy of 11 years, 4 months, the second of three children. Began school at 6; has repeated the fourth grade; felt to be still unprepared for promotion. The complaint on which he is brought is backwardness in school. In psychometric examination he coöperated well, but seemed rather underactive, possibly shy;

at times he would break through this and react with good interest, better to apparatus than to ideational tests. The Stanford basal year is 9. In year 10 the first four tests are passed, also XII-1, 4, and 8. This yields a mental age of 10 years, 5 months; IQ 92. In non-language tests he made better scores, the year levels being $12\frac{1}{2}$ in the Porteus mazes and $15\frac{1}{2}$ in Healy PC-II. In tests of the construction puzzle type he again scored above the average for his years, though the learning was less than one would expect. Tests were made with special reference to attentional control. Simple reaction time with the right hand was 179 sigma; left hand, 191 sigma — well up to the average for the stimuli used, also of good regularity. In the Woodworth-Wells Substitution Test he rated somewhat below the average. The work is irregular, frequent reference to key. The "Bloomingdale" Attention Test also shows several lapses. On the other hand, attention was well sustained in performance tests such as the Porteus. It was felt that these findings were not consistent with the reported backwardness in school, and it was suggested that this be further inquired into from the standpoint of his general adjustment.

Under more general inquiry the school problem recedes into the background. In a rather highly colored account it is stated that the patient defaces the home with a knife, quarrels with own siblings and other children, sets fires at opportunity. Father's discipline good, but he is away a good deal; mother does not control well. Boy makes good appearance, frank, friendly, normal interests and ambitions, no grievance against parents, tastes run to the sensational. Lack of effort in school. Older brother's influence questionable. Difficulties secondary to surroundings. Recommendation: a controlled environment away from home.

Sent to a country school, the boy made good adjustment, mixes well; somewhat retarded in scholarship, but doing fairly. Physical improvement marked. Frank attitude toward old delinquencies. After five months at school returned home, where adjustment is satisfactory. Doing fifth-grade work in school; earning a little money after hours; better contact with other boys.

Case IV. A woman of about 50, of foreign birth, in this country more than half of life, married, with eight children, the educational and general adaptive level of whom are clearly above average. Patient herself has apparently had no formal schooling (though able to read her own language); has only lately been taught by one of

her daughters the letters of the English alphabet and to write her name. On the other hand there is evidence of considerable economic efficiency, the patient having successfully owned and operated several stores, relinquishing business at about 40 on account of ill health. Is felt to have recently given evidence of abnormally litigious disposition in seeking redress from marital difficulties.

Patient is brought by husband on the ground of psychosis, but no evidence of this develops. The difficulty appears one of marital maladjustment for which the major responsibility lodges elsewhere.

In psychometric examination by the Stanford scale it was never difficult to get her attention, but quite so to hold it. The score was somewhat modified by language difficulty, though it would hardly be raised more than a year of mental age. Some responses were colored by her background; thus, regarding the engineer with more cars, "he could go faster because he is making more money." The post-office picture she characterized as possibly an old man's home, though she read the words "post office." Up to a certain limit her mind functioned well; she counts backwards from 20 to 1 in 12 seconds without hesitation and readily gives five digits backward on the first trial. What to do before an important undertaking she exemplified in terms of starting a new business, considering the capital required, the location, etc.

The chief interest of this case is the moderate level shown by the "intelligence" examination in an individual well above the average in other spheres of adjustment. No appeal can be had to language difficulty, for this was relatively slight and must itself be considered in relation to the long residence in this country. The patient, whose husband seems in no way superior to herself, has successfully borne and reared a large family of children, and though retired from business as above, still competently manages a large domestic establishment.

Recommendation was for separation from husband, with legal steps for the conservation of patient's property. Patient has since been living with a group of her children, stated to be getting along well and happily. Financial adjustments are still pending.

Case V. A boy aged 9, the third of five children. Third year in first grade of school; attendance irregular; truancy. School work variable. Charged, in company with another boy of 5 years, of causing the death of a baby girl, pushing her into a shallow pool of water and stoning her.

In psychometric examination the boy coöperated well. Was somewhat overactive and euphoric; easily distracted but generally returned to task of own accord. Impression of alertness that might be confused with intelligence. Responses made in an assured manner independently of value.

Stanford basal year was V, there being no successes above VIII; IQ 79. Certain responses reflecting his background were (raining — school) "don't go"; (broken something) "nothing"; (river scene) "scared and trying to get away from something they have done." Manual tests, such as the construction puzzles, he did somewhat better, but his good scores seemed to come from over-activity, producing chance successes. The picture-completion tests were accomplished impulsively with any blocks that attracted his fancy. The general psychometric level is borderline.

Both heredity and home environment are poor. The patient, for example, does not eat at home, being given occasional pennies and allowed to forage. In addition to truancy the patient has taken part in numerous thefts, but the outstanding feature is cruelty toward animals (cats) and children smaller than himself. He recounts these episodes with dramatic glee. There is active fantasy life, in which he represents himself variously as a "tough guy." Concerning the charge he is evasive and tells many contradictory stories, among them admissions. Little insight; will go back to school. They do not know of his difficulty; the police know, but cannot tell the school because they do not know to which school he goes.

From the point of view of psychic mechanism, conduct of this type is often associated with gonadal excitement, and there is evidence such was the case in this instance. Classification is psychopathic personality; no psychosis. Recommendation is for custodial confinement for "as long a period as possible," and this has been undertaken. If no further antisocial or psychopathic tendencies were observed, the patient would under the law be released not later than the age of 21 years.

Case VI. A man of 24, third of several children, none of whom have presented social problems. Reached the seventh grade at 16, being kept back once for illness. Has worked at various unskilled occupations. Has a court record; charges of cruelty to animals and "unnatural act." These cases were filed, but he was sent to a school for feeble-minded under suspended reformatory sentence.

Now referred by the court on a second charge of the latter nature.

Gave normal coöperation in psychometric work, without spontaneous remarks. A point-scale examination had been made five years previously, showing a mental age of 10 years, 8 months (64 points). Mental age at the feeble-minded school graded 10 years. The present Stanford examination grades also at 10 years, abstract definitions alone being passed above this level and digits forward failed within it, an exceptionally regular record. Performance tests gave a higher rating; Porteus score, $12\frac{1}{2}$ years; Healy PC-I above norms; Healy PC-II at 14 years. Dearborn Formboard No. 3 on the other hand yielded only a 7-year score.

Recommendations hinge on the substantiation of the charges, which are denied by the patient. The psychometric records are not such as to indicate placing the patient in a custodial institution. But granting antisocial tendencies to be as charged, the limited intelligence will make it difficult to correct them, and custodial environment is advisable from the standpoint of society.

Charge appears not to have been pressed. Has held positions and paid certain old debts; no complaint has been heard, though he is considered inferior. Appears for the time being to be reasonably well adjusted.

Case VII. A girl of 14, orphan, being cared for by relatives. At present in sixth grade of school; tries hard but does not do well, partly from intermittency of schooling and partly subaverage mentality. Is pregnant, the man being under charge of rape; patient is referred for study, aside from the matter of the age of consent, as to whether this charge could be sustained on the ground of defective intelligence in patient.

Attitude in psychometric examination showed very little spontaneity; the patient slouched in her chair and answered questions laconically and with little affect, though smiling two or three times. She did not give the year of her birth or age correctly. The mental-age score in the Stanford was 9 years, 8 months; the IQ 71. Some of the responses were (balloon) "a kind of ball, only blown up"; (soldier) "a man with a gun"; (cup) "some kind of a dish, some kind of a kettle." In the test for rhymes she gave as rhymes for "spring," "ring, sing, trying, ringing." Asked the likeness between a knife blade, penny, and piece of wire, replied they were all silver. Asked to state the time with the hands of the clock reversed for 6.22,

she answered, "22.6"; for 8 minutes past 8, she answered "8 minutes of 8." In the Porteus mazes and Dearborn Form Board No. 3 the age-level score was between 9 and 10 years, but in the P. C. test the score was within normal average limits. In tests of the construction puzzle type her work was inferior; made successes by chance, but she was unable to profit by them and in general showed a random approach.

The patient's heredity shows some evidences of lax standards. From the point of view of personality, the patient reads a great deal, imaginative and romantic material, and likes similar movies. Is mostly alone; prefers younger children for play. There was no instruction in sex matters. Did not even know about menstrual function when it began. Does not react seriously to present situation. States she was assaulted in her own room while in bed, no one else being in the house.

Psychometrically she was regarded as a moron, a quite passive type with good surface personality. From the history it is improbable that she had a reasonable understanding of the action that brings her to the clinic, purely on the basis of lack of information. There is an additional question whether the intelligence level is such that she could have a proper understanding even with a normal amount of instruction. A mental age of 9 years, 8 months, such as she shows, is not infrequently seen in adults of satisfactory social adjustments, but when seen in a girl of English-speaking ancestry, still going through school, it is much more indicative of intellectual defect. She was regarded as a case requiring special safeguards.

In court the girl's story was doubted, and the charge of rape not sustained. The father was ordered to make some payments on account of confinement and bastardy, a small part of which he did. At the time he was living with wife and children. When the baby came, the patient had no interest or affection for it, and after being boarded by an agency for a year, it was turned over to the civil authorities. Outside of this episode the girl was never and is not a conduct problem. She is contented. Has no desire to go on with school, but is apparently developing good economic efficiency along lines of domestic service. From the point of view of sex adjustments, the outcome is still problematical.

Case VIII. A woman of 19, the second of five children. High school education; has done some elementary artistic work. Comes to clinical attention on account of adjustment problems arising from unmarried motherhood.

In psychometric examination was at first somewhat reserved and suspicious; later more coöperative. In the Stanford scale every test in groups XIV, XVI, and XVIII was passed except the ingenuity test (IQ 1.19, maximum 1.22). No other test caused more than momentary difficulty. The Porteus mazes, Dearborn Formboard No. 3, and Healy PC-I yielded average scores; Healy PC-II, a superior adult score. A 100-word association test of the Kent-Rosanoff type yielded average scores in respect to time and frequency and was of an "objective" type.

The history discloses lack of sympathetic understanding between patient and parents. Outwardly the patient gives evidence of good adjustment with many friends and healthful, outdoor interests, these latter being especially marked and effective. Patient does not rate herself so highly in these respects. No special boy friends known to family before the present episode. The patient discloses a sex history beginning with seduction at 5 years by an older boy, and following this episode many others through the succeeding years with an indefinite number of boys. Claims relative passivity in these affairs; no special affection or organic satisfaction. Has normal affection for her baby, but no wish to see its father again. Makes no effort to analyze the motivation of her conduct.

It was economically not practicable for the patient (also from the point of view of her health) or her family to retain the child, and even where this is the case, a serious question arises as to its being for the child's interests. It did not seem a just principle to sacrifice the child for its potential contribution to the mother's future stability. Early adoption was recommended to obviate further fixation of the patient's affections. In view of a complicated domestic situation, a girls' camp seemed the best *modus vivendi* for the patient herself, with vocational recommendations along the lines of her interest and exceptional capacities.

The patient is of unusual attractiveness, and the history creates misgivings as to the future. There have been no subsequent complications so far as known. It is not a type of case normally coming to psychiatric observation. From the point of view of social ethics, it is interesting for the preservation of superior personality in the presence of a sex life quite disapproved by ordinary social standards

Case IX. A woman of 30, English-speaking, sent by the immigration authorities for examination as to fitness for admission to this country. A Stanford examination scattered over nine year levels, from a failure in the divided rectangle at 5 years to remembering seven digits at 14. The mental-age score was 7 years, 8 months; IQ 47.

The history is necessarily fragmentary, being based essentially on patient's own report. Family and medical history given as negative. Claims to have been a fair school pupil, but the record is of equivalence to the fourth grade reached at 13 years. Has never worked except at home. Psychiatric examination records a low-grade mentality, no knowledge of own country or current events, even simple questions requiring repetitions.

The extreme psychometric scattering would raise the question of deterioration. At the level shown it was felt unlikely that she would make a suitable adjustment to American conditions. The patient was deported to the country of origin.

Case X. A woman aged 24, referred by the Immigration Service as to fitness for admission. Educationally she appears to have reached the equivalent of the fourth grade at the age of 10, but to have had no schooling beyond this. Knows some elementary facts about housework.

In psychometric examination she coöperated on a par with her observed reactions in general. She was consistently below par in the Stanford; her best test, memory for digits, being at the 10-year level. The IQ was 48. Healy PC-I was also very inferior, though Healy-A was within 10-year norms. The general indication of the test was intelligence on the line between imbecile and moron levels.

More generally her reactions are stilted and clumsy; talk is loud but monotonous. She gave 4×4 as 12, 2×2 as 6, 6×6 as 18, $20 - 7$ as 13, $20 - 5$ as 8. Could not tell what was the matter with her mother, who had died a few months previously; "Heaven took her, that's all." Her native city (of about one million inhabitants) is the largest in the world. Can do things of simple grade, but breaks down completely as soon as a special level of complexity is reached.

It was considered that while she could be a useful member under supervision, there was insufficient reason to expect her to make independent adjustment to the life of an American community. Patient was deported to the country of origin.

Case XI. A boy of 11, oldest of seven children, all of whom are healthy save the patient and the next oldest, who is "fidgety." The economic circumstances are straitened, father not lazy but work is irregular, and at times he drinks to excess. Mother has been anæmic for many years, condition becoming worse after each pregnancy. Patient is in the fourth grade at school and is said to be backward and to have repeated one grade but to like school. Besides the backwardness in school, complaint is made of a number of neurotic traits, such as tremblings, stuttering, enuresis, and general unmanageability.

In psychometric examination there is some initial timidity, but fair coöperation on the whole. He was less talkative than the average, and difficulty of expressing himself was noted. This also appeared in the result of the Stanford examination. The record scattered from years VIII to XVI; the lowest failure was rhymes, the highest passed, enclosed boxes. The IQ score was 94. The examiner felt that among the features of the responses was a difficulty in "propositionizing." It is a type of reaction on which non-language tests would have thrown much light. Educational tests should also have been of significance. The record available serves chiefly to indicate the absence of general intellectual defect. There was apparently no physical problem except undernutrition.

The history is silent as to details of management, but apparently it was effective. A considerable follow-up presents the boy as no longer a problem, no return of enuresis, gets along better with other children; now in fifth grade. While mother was working to help support the family, he took entire charge of the younger children, getting the dinner and setting the baby in the doorway to get air (no playground but the street). The mother had to stop work, being again advanced in pregnancy. In general the household presented the picture of a plucky fight against distressing economic conditions, one in which it is necessary for them to accept from time to time the help of social agencies.

CHAPTER FIVE

A DERIVATIVE OF THE KUHLMANN SCALE

The Kuhlmann scale — The Kuhlmann Supplementary Series —
Individual tests of the Kuhlmann Supplementary Series

The Kuhlmann scale. In 1922 Kuhlmann published the most elaborate and painstaking revision of the Binet scale that has been made (13). Rather more than half, and distinctly the more valuable half, is new. Kuhlmann seems to be the first to attempt seriously the organization of tests for infant years. There are enumerated five accomplishments for each of the age levels: 3 months, 6 months, 12 months, 18 months, and 24 months. As tests they are necessarily crude compared with those that follow, but they are serviceable and make few demands on apparatus. A more elaborate scheme for gauging the mental development of infants is also available through the work of Gesell (47), though not as part of an intelligence scale covering a wide range. The comprehensive scale developed at the Merrill-Palmer School and covering the ages 18 months to 5½ years is just published by Stutsman (47 a). Gesell (47, 425) believes that the first two years are often sufficient to afford a definite prognosis as to further mental development; Baldwin and Stecher (48, 255) and L. S. Hollingworth (119, 42) take a more conservative view.

On its common ground with the Stanford, the Kuhlmann scale consists of eight tests for each year level. Each year level from 3 to 12 inclusive has a series of eight tests, and there is a final one designated 13–15 years, which is substantially equivalent to low-average, average, and high-average adult intelligence, though Kuhlmann prefers to regard the average adult level in terms of 15 years (13, 82). For briefer observations Kuhlmann suggests four tests per year, thus making two short scales out of the one complete one.

The Kuhlmann scale makes much more use than the Stanford of tests occurring at several year levels. This is especially true of the tests which Kuhlmann has added. In this respect his scale is intermediate between the conventional Binet and the performance tests. As a whole the scale is less dependent on the use of language by the subject, especially in the new tests.

From the point of view of experimental psychology, the Kuhlmann scale is a more refined instrument than the Stanford. It bears more of the laboratory impress. Its conditions in the new tests at least are more clearly defined and invite a more precise study of the patient's total test reaction.

On the other hand, the Kuhlmann scale is undeniably more cumbersome. It uses a very large number of printed cards, and these cards are not of standard size; one is so large as not to go into a letter-size folder. Many printed forms also are used, making a multiplicity of special material quite foreign to the Stanford. The scoring is also more complicated, special formulæ being required for many tests, particularly the new ones. And while so far as responses are concerned the scale makes fewer demands on language than the Stanford, from the point of view of instruction rather the reverse is true. Some of the advanced tests require elaborate preliminaries. All these features have their good side, because they tend to restrict the use of the test to those who have a genuine and major interest in psychometric technique. The Kuhlmann scale makes far greater demands on the examiner than does the Stanford and is thus likely to select its users to its own advantage. One is tempted to believe this was not wholly beyond the author's intent.

The difficulties of this new scale, among other points of clear superiority to what was in use, offered the problem of how best to assimilate it into the current system of psychometric examinations. One might have followed the example

of at least one prominent clinic and discarded the Stanford in favor of the Kuhlmann. This makes the better a too effective enemy of the good. In any such question the issue is not whether the newer is intrinsically better than the older, but whether the entire result of substituting the newer will be better than what now exists. Industry will afford many examples of a new idea, intrinsically an improvement, shelved because of the economic cost of putting it into practice. A closer analogy is to simplified spelling. It costs more psychologically to adopt it than to continue in the familiar way. The Stanford has in its favor its wide experience, so that one can talk readily in its terms to the clinician or to the social worker. One must also consider the loss of time through "interference" involved in replacing the former method by the latter one. In the matter of training, the Stanford will be learned effectively in much less time.

In general the correspondence of Kuhlmann and Stanford scores is so close as to obviate serious question as to relative reliability of scores. The difference in scores is not often such as to affect the understanding of the case from this point of view, but in such cases the question remains of which score is the more serviceable. Plant has found nearly identical Kuhlmann and Stanford scores in normal children, in psychotic cases Kuhlmann scores running about 10 per cent lower. The general adaptive difficulties in these individuals are thus more manifest in the Kuhlmann. It is probably, as Plant considers, somewhat better as a criterion of general adaptation, while the Stanford retains advantages from the point of view of strictly ideational capacity.

As one goes beyond the psychometric score into closer study of the whole test reaction, the superiority of the Kuhlmann asserts itself more clearly. But comparatively few examiners have a background enabling them to utilize this superiority of the Kuhlmann in an effective way.

What was done in view of these considerations was to organize the tests distinctive of the Kuhlmann scale into an independent test series and utilize this test series as a scale supplementing the Stanford in cases where especially precise psychometric study was called for — for example, in legal questions of mental defect.¹ The result of this was to retain the advantage which the customary procedure had as such and to gain what the new method had to offer where it was most needed. This chapter discusses the group of Kuhlmann tests organized for this purpose and termed the Kuhlmann Supplementary Series.

The Kuhlmann Supplementary Series. The most prompt introduction to this test series is probably afforded by reproducing on page 91 the record blank used for it. It is seen to embody only a much abbreviated form of the scale in the earlier years. The proportion included increases, and the last two levels are the same as the regular Kuhlmann series. In learning and giving the scale it is found convenient to note the tests assigned to it prominently in red pencil, on the margin of Kuhlmann's manual for the entire scale. These marginal notations should consist of the year level and the serial number of each test. It is necessary to give the closest attention to the standard manual, owing to the complicated

¹ S. Sheldon Glueck (*48 a*, 135, 137, 194-197, 208 ff.) calls attention to the common-law presumption that children between the ages of "7 and 14" are incapable of committing a criminal act. Translated into terms of mental age, this places the presumptive incapacity for criminal acts upon about half the population, the 14-year level being the approximate score which the average adult reaches. Glueck brings this out in his second footnote on page 210 and suggests making the range from 7 to 12 years. The 12-year level would include some 15 per cent of the population (cf. also page 294 of this volume). In the writer's opinion, limited responsibility in an adult on the ground of deficiency in "intelligence" should be only guardedly urged on a mental-age score of over 10 years. This level is much the nearest to the upper level of feeble-mindedness, according to ordinary percentile criteria. The points cited on the general question from the Supreme Court of New Jersey (*48 a*, 195-196) are psychologically well taken.

procedure of many tests. As observed, its demands in this respect are much more than those of the Stanford.

Individual tests of the Kuhlmann Supplementary Series. Kuhlmann seems desirous of avoiding distinctive names for his tests, but one can hardly discuss them without some symbols to designate them, better associated with them than mere numbers would be. The rationale of the names assigned on the record blank will probably be clear on the examination of Kuhlmann's manual. The first of the tests involving matter for special comment is Test IV-6, recognition of forms.

It brings up a point arising in other parts of the series, where there is a large card or sheet to be manipulated in reference to a small card. Little is said about the position of the small piece of material in reference to the large one, and it is in the interest of accuracy to keep this as constant as may be. In the present case it would seem best to put the small cards between the subject and the large card, in line with the middle of the large card as it lies, face down or face up, before the subject (somewhat as in the analogous Stanford IV-2).

The easier paper-folding test (V-7) is the first one to introduce the factor of timing. In this test series a stop watch is all but necessary, though the timing need hardly be closer than to the seconds unit. The instructions for this paper-folding test count the errors always as "three minus the total number of folds he has made correctly," etc. In other words, if a person had made two correct folds, it would make no difference how many incorrect ones he made, only one error would be scored. The same situation applies in a similar test (VIII-7), where five folds are required instead of three.

It is difficult to see reasons why tests of this kind, as well as allied ones in the Stanford scale, should not be organized with standard rather than odd sizes of paper.

BOSTON PSYCHOPATHIC HOSPITAL

PSYCHOLOGICAL LABORATORY¹

KUHLMANN SUPPLEMENTARY

SERIES 14

HOUSE

Name..... Birth-date..... Date..... Time..... O. P. D.
 Foreign Lang. Difficulty; None; Some; Marked. School grade..... at..... yrs.
 Willingness..... Effort..... Physical Activity..... Speech.....
 Examiner.....

III-7. Pict. mem. 1, 5, 9. 2 of 3
 8. Tracing squ. 10''. 4 cross

IV-5. Trace irreg. form. 15''. 4 cross
 6. Recogn. forms. 10''. 2 of 5
 8. Pict. mem. 2, 7, 12. 2 of 3

V-7. 124, 134, 234. 1 of 3

VI-6. Taps. 4, 6, 4, 6, 5. 3 of 5
 7. Fold paper 20''. 80''. $t/60 + E = 1.5$
 8. 1324, 1432, 1423. 2 of 3

VII-6. Ops. $t + E = 5$

VIII-4. Directions 4 of 6
 5. Ops. $t + E = 3$
 7. Fold paper 35''. 100''. $t/100 + E = 3.7$
 8. Dots $T/10 + 5E = 26$
 10, 14, 11, 13-14, 10, 13, 12-10, 12, 14, 11

IX-6. Directions. 30''. $t/5 + E = 7$
 8. Dots $T/10 + 5E = 20$

X-2. Dots $T/10 + 5E = 15$
 3. Spell backw. 60''. $t/5 + E = 7$
 4. Taps. 9, 10, 12, 11, 12. 3 of 5

6. Cross-line. 30''. $5(T/3 + 10E) = 340$
 7, 5, 8, -3, 6, 1-2, 9, 4.
 7. qrst. 30''. $T/5 + 5E = 128$
 8. Ops. 10''. $30(t + E) = 280$

XI-4. Cross-line. 30''. $5(T/3 + 10E) = 225$
 5. qrst. 30''. $T/5 + 5E = 117$
 6. Arithmetic. $T/5 + 10E = 150$
 7. Ops. 10''. $30(t + E) = 235$
 8. Unf. Forms. 10''. 60''. $7t + 10E = 245$

XII-1. Spell backw. 60''. $t/5 + E = 5$
 2. Cross-line. 30''. $5(T/3 + 10E) = 185$
 3. qrst. 30''. $T/5 + 5E = 110$
 4. Arithmetic. $T/5 + 10E = 140$
 5. Ops. 10''. $30(t + E) = 195$
 6. Unf. Forms. 10''. 60''. $7t + 10E = 205$
 7. Hard Directions. $2(T/6 + 5E) = 165$
 8. Quarters. 1.3 $(T/5 + 10E) = 133$

Ad-1. Arithmetic. $T/5 + 10E = 125, 112, 100$
 2. Ops. 10''. $30(t + E) = 160, 125, 100$
 3. Unf. Forms. 10''. 60''. $7t + 10E = 165, 130, 100$
 4. Hard Dir. $2(T/6 + 5E) = 140, 120, 100$
 5. Quarters. 1.3 $(T/5 + 10E) = 118, 108, 100$
 6. Tri. on sq. $t + 15E = 113, 106, 100$
 7. Inv. Forms. $t/2 + 10E = 190, 145, 100$
 8. Syllog. $t/10E = 125, 112, 100$

¹Adapted from Kuhlmann's *A Handbook of Mental Tests* (copyright, 1922, by Warwick and York, Inc.) by special permission of author and publisher.

In Test VIII-4 the subject draws lines from the center of a square to designated points on its periphery. Occasionally the subject draws from the periphery to the center. Nothing is said about this contingency. The response is not less intelligent than that asked. The subject might be corrected; scoring as failure would hardly be admissible.

The sheets for the paper-folding test (VIII-7) must be prepared by marking the center; a cross, Kuhlmann suggests. Another way is to perforate the sheets, a number at a time, with a pin and mark the crosses thereon at least for the sheets used by the subject. It is important to have the center marked accurately, or the folds will not correspond to specifications. In the directions for the first item are the words "Fold the left edge on to the right edge." The subject may fold the right edge on the left edge; the result is the same, and it is a reasonable question whether this should be counted as an error.

The test of counting dots, first appearing at VIII-8, corresponds to the serial weights of the Stanford as a convenient test to start with, at least for subjects within its range. It makes moderate demands on language and covers the year levels 8, 9, and 10; nor is it one which those of higher intelligence will despise. Silent counting is specified, but nothing is said about counting with the fingers, which is undertaken by some. It changes the character of the test a good deal and should probably not be allowed.

In the scoring of Test IX-6 (a directions test, drawing squares on circles), the question may arise if the time taken on wrong drawing should enter into the average for the time score. As the test specifies, the time for the six trials must be taken; that is, the time for right and wrong responses should be averaged. The rationale of this procedure is open to some debate.

In scoring the spelling of unfamiliar words backward (X-3),

a similar point is involved. Should the " trials on which he fails" enter into the average time of the words scored? The cases concerned are those where the word is easily spelled forwards but has been wrongly spelled backwards. The question is one " of law," and the text hardly settles the matter; but the following extract from a letter of Dr. Kuhlmann's appears to clear this up:

Words, however, that he can spell correctly forwards are counted as trials, irrespective of whether he spells them backwards correctly or not, and five such words are used from each of the lists of twenty. The t ¹ in the scoring formula means the average time of the ten words counted as trials, and the E means the total number of words in these ten trials that he spells wrongly backwards. In general, the same rule holds for all the tests; that is, the t means the average time for all trials counted, and the E means the total number of errors in these trials that are counted.

One may meet with spellings of other words than those in the list but which sound similarly; thus, " prints " for " prince." Such responses may presumably be taken at their face value.

In making the " qrst " test (X-7) the subject should preferably use a pencil not harder than No. 2 or grade M. The examiner should not mark over and over on the key letters with a view to emphasis, for the subject will get the idea that he must do the same and lose much time. Kuhlmann suggests keeping count of the errors while the subject is at work. The present writer questions this as rather disturbing to the subject to be so closely watched and imposing added chances of errors in the experimenter's observation. Although involving more time, the writer has preferred the subsequent scoring of the record by a stencil made of tracing cloth. This is the exact size of the blank, and the correct marks are registered on it in light-colored

¹ In the present connection t is used to designate an average time; T , a total time. (Cf. the record form, page 91.)

ink. The record is superposed on the stencil and both held against the light. Errors are thus conveniently counted and marked. The scoring formula for this test seems unusually liberal.

The "unfamiliar forms" test (XI-8, etc.) is one of the special contributions of Kuhlmann's psychometric genius. Certain details of its administration are well worth discussing. There is nothing to indicate top or bottom on the cards as they are issued, and one may assume these as fixed by the numbers on the backs of the cards. It is, however, desirable to indicate this on their faces. It is easily accomplished by an inconspicuous ink line drawn across the center line of the card to designate the bottom.¹ The card is then placed so that the line is between the subject and the circle to be drawn. The card should occupy a uniform position with reference to the circles on which the lines are to be drawn. It would be natural to place the card just beyond the sheet and on its center line. This has the disadvantages that (1) the later circles require more eye movement between the card and the drawing circle, and (2) the subject is likely to fill in the circles in an irregular order. The present writer follows the practice of laying the card directly above the circle which is to be filled in; this obviates both the above difficulties. A uniform placing of the drawing sheet is also maintained, the side with the three circles at the bottom being nearest the subject. Some subjects like to hold this sheet at an angle with the way they are facing. The position of the card is, of course, altered accordingly.

A good card to use for instruction purposes in this test, showing the points at issue, is No. 8 of the series; 4, 5, 6, and 7 do not bring them out so clearly. The card is exposed and

¹ A similar procedure is in order with the stimulus card of the dot test (VIII-8, etc.), with cards 2 and 4 of the cross-line test (IX-6, etc.), and with the inverted forms test (Ad.-7).

the watch started from zero. After ten seconds the card is quickly covered with the hand and removed while still so covered, the watch being kept going. The time of such record is the time shown by the watch minus ten seconds. This procedure also applies well with other tests requiring a fixed preliminary period of study, such as the cross-line (IX-6), "qrst" (X-7), etc.

When the test card is removed, the examiner should keep it in his hand for ready comparison with the finished drawing. It should be entirely out of the subject's sight, for the reverse side also affords some clue to the actual diagram. In scoring, Kuhlmann says the subject should be allowed to "see" the mistakes he makes, but does not say that attention is to be called to them. Saying nothing about them puts a premium on the alertness and interest of the subject but introduces an additional variable. It seems best, on the whole, to note if errors are seen spontaneously, but to call attention to those not seen. This consideration applies also in the inverted forms test (Ad.-7).

The last item in the hard directions test (XII-7) as modified by Kuhlmann is particularly confusing and subject to error. A characteristic error is for John Smith to write "J" on the left end and "h" at the right end of the dotted line. It is not clear from the text whether this counts as two errors or one. Both are wrong, but as with transposition in digit memory series, one error involves another. Bearing in mind Kuhlmann's liberality regarding the order of digit memory series, it seems fair to suppose that it should count as one error. "J. . . . s," on the other hand, would be clearly two errors.

In the "quarters" test (XII-8) it is convenient to instruct the subject, on the trial card, to expose the problems one by one, by drawing down over the problems the edge of the sheet on which he marks; as he finishes each, he exposes the new

one. He can do this quite as well as the examiner, and it gives him less sense of being watched over. It is desirable to make a mark illustrating what "cross out" is taken to mean. For the examiner the procedure would have been simplified if instead of "crossing out" the dot, the subject marked over each one the serial number of the problem appertaining to it. Often the subject "crosses out" wrongly a dot which is actually to be crossed out in some other problem, and the checking of these errors is difficult.

Certain items in the "triangle-on-square" test (Ad.-6) are capable of more than one solution. In Items 2 and 4 two triangles can be drawn for each that fully meet the directions. In Items S, 1, and 5 a second triangle can be drawn meeting the directions, if "passing through" be taken to include a line producing a side beyond the corner of the square. It does not appear that this is intended to be accepted. Nevertheless, the subject might reasonably be warned that this is incorrect, just as he is told he "cannot fill the 3-quart pail two-thirds full" in the Stanford ingenuity test. Items E and 3 seem capable of but one reasonable solution. Scoring will be facilitated if the examiner makes a chart of the correct responses for his own reference.

In the test for inverted forms (Ad.-7) some subjects will twist the paper about and crane their necks to get even a side view or something approximating an inverted view of the material. The conditions should be made such that the paper maintains a uniform position with reference to the subject's view. In the writer's experience the test has proved considerably easier than the one following.

The "syllogisms" test (Ad.-8) appears the most difficult test that has been included in any standard psychometric series. Only superior adult levels have been seen by the writer to make anything of it. Negative affective reaction to it is often pronounced. Persons making excellent scores up

to this point have broken down completely on it, and with much more instruction than the letter of the law requires. Unless the examiner be much more skillful in this matter than the present writer, he will find it convenient to chart the proper solutions for his ready comparison with the subject's records. When the illustration circles are drawn, the identifying letters should be so sketched in as to intersect the circumference to which it refers; otherwise there will be confusion as to what letter designates what circle. There are cases where a partially correct response can be given; thus, "Some C is not A" instead of "No C is A." Kuhlmann advises (in correspondence) that the subject be instructed to give a statement embodying the whole truth, not only a part of it. The partial response is not accepted. In this test there again arises the question of including in the average response time the time for the responses which are wrong. It is unpredictable how the scores will be affected, since there is no reason why the wrong responses should be uniformly shorter or longer than the right ones in this test. It would appear that all trials are to be counted independently of error in computing average time. Sometimes a right answer is produced with a wrong drawing. This is unacceptable. These are, however, not all the questions that may arise in regard to the syllogisms test. To administer it properly it is necessary to be familiar with the more detailed account of the method given by Toulouse and Piéron or to have a good grounding in the technique of formal logic.

REVIEW QUESTIONS AND EXERCISES

1. What are the chief sources of tests for the development of intelligence in the pre-school child?
2. Compare the Kuhlmann and the Stanford series.
3. Describe fully the "unfamiliar forms" test of the Kuhlmann scale.
4. Class experiments with the projection apparatus, the students timing themselves or with a time limit, should be made with such tests as cross-line, XII-2; unfamiliar forms, XII-6; quarters, XII-8; triangle-on-square, Ad.-6; inverted forms, Ad.-7; syllogisms, Ad.-8.

CLINICAL MATERIAL ON THE KUHLMANN SUPPLEMENTARY
SERIES, WITH SPECIAL REFERENCE TO COURT CASES

Case XIa. A boy aged 18, only living child; an older half brother, to whom well adjusted. Some domestic friction on the background of a second marriage of father. About two years behind grades in school, reaching a level of grammar school graduation about 16. Is referred by court on charge of appropriating an automobile under circumstances raising question as to his mental responsibility.

Under Stanford test he made a normal appearance, with good effort. The IQ was 101, much superior to what would be anticipated from the school history, and with little scatter. Owing to the court issue, the Kuhlmann tests were given as a check on the Stanford. Here also he made a normal appearance and a score rather better than on the Stanford. It was indeed maximal, except for a "13-year" score on the unfamiliar forms and failure with the syllogisms, a result consistent with the observation by the Stanford examiner of a limited capacity for symbolic thinking. The result precludes any modification of responsibility on the ground of defective intelligence.

For the past five or six years the patient has, in addition to scholastic difficulties, indulged in petty thieving from other members of the family, and on one occasion stole several hundred dollars. Does not adjust well to companions; interest and recreations generally of a passive type. Is rather reticent, easily embarrassed, feels an inferiority for which he has tried to compensate by fantastic romancing about himself. Not well adjusted in home, as above. Recommendation was for close supervision away from family, with more active interests, but the outlook was regarded with some reservations. Information has been received that he is now under sentence for subsequent larceny of an automobile.

Case XII. A man aged 56, no anamnesis obtainable; married, but separated; grammar school education, left at 11 years. Has done odd jobs, irregularly, for years. Referred by court on vagrancy charge.

In the Stanford scale a normal appearance and record were made, with an IQ of 82, scatter through only two year levels. Memory for digits was the weakest point. The Kuhlmann scale gave an even better record, slightly above adult average, maximum scores being made in the "opposites" and "quarters" tests. Here again there

was very little scatter. Another interesting feature was the freedom from errors, none being found in the cross-line and the "qrst" as well as the opposites tests. Several errors were made in the "hard directions," the verbalism appearing to confuse him. In the absence of foreknowledge, which there is no reason to suspect, the record bespeaks an intellect of more than usually good organization.

In striking contrast to the above is the meager information, all from the patient, of the actual background. He was a mill worker and waiter until about 40; since when he has done odd jobs only. About this time he was married; no children; home broke up after three years. The break in compensation may well have come in connection with this effort at a mental adjustment beyond his powers. At present no ideas of reference or persecution, chief anomaly the behavior disorders in the presence of good intellectual powers. The picture falls under the concept of a simple schizophrenic deterioration, probably of some ten years' standing, which was regarded as sufficiently marked to warrant commitment. He was returned to court under the diagnosis of dementia præcox, unimproved. He was committed to the State Farm, where it is not surprising to note that he is adjusted satisfactorily, being fairly efficient and in good health. An IQ obtained scores "91 +," about the score which the Kuhlmann record here would have given him. All the above facts are consistent with psychiatric diagnosis.

Case XIII. A man of 28, single, the third of ten children, all normal. Good domestic situation. Mother normal, but father has violent outbursts of temper and sometimes talks in a scattered way. Patient made eighth grade in school at a normal age, then worked for about four years each at factory and clerical jobs; since then has alternated between idleness and short jobs; recently has made no attempt to find work. It is complained that the patient assaulted an old man under the impression that it was his father. Sent by direction of jail physician.

In a Stanford test he seemed to be coöperating normally, but there was no spontaneous speech. The IQ score was 69. The president was said to be chosen by "electrical" votes. Under Kuhlmann examination the general attitude was similar, but there were bizarre features. In response to the opposites test he repeatedly produced free associations and made unscorably low record, although he had comprehended the directions satisfactorily.

The arithmetical test he worked at for nearly twenty minutes, making eleven errors out of forty examples; also a systematic reading of the plus sign as minus and of the minus sign as plus. His errors seem to bear little relation to the difficulty of the problems. He did especially well with the "unfamiliar forms" test, where his speed was sufficient to make a good final score in the presence of many errors. The comparison with the Stanford is in accordance with Plant's observations and indicates mental disease rather than constitutional deficiency.

As a boy, the play life is described as normal. In school he was a specially "quiet" pupil, never a disciplinary problem. Sex life apparently negative. No alcoholism, gambling, dances, or social activities generally. Silent, never joking, always came home with sad face. Lost temper easily; once struck his mother, then felt disgraced and unable to come home again. Present picture shows many features consistent with above background; in ward is quiet and seems preoccupied; memory and orientation show no impairment; expresses marked feeling of inferiority; many autochthonous ideas, some hallucinosis. No idea of anything wrong with his mind. The above picture is wholly consistent with the schizophrenic group of disorders, in accordance with which hospital care was recommended and a suitable transfer arranged; adjustment since then has been in accordance with the usual outlook in such cases.

Case XIV. A girl of 23, third of five children; all others apparently normal; not living at home. School history is normal, seventh grade being reached at 13 years. Has held various industrial and domestic jobs. Is referred by the court on a charge of sex delinquency which she denies in a logical and coherent manner, though having apparently failed to avoid an indiscreet situation.

In psychometric examination she coöperated normally, though it was necessary to guard against a slight hearing difficulty. The Stanford IQ was 76, rather low normal, very regular, only two tests passed above basal year. The Kuhlmann score is exactly the same for general level, but more scattering is shown. In this she failed the paper-folding test in year 8, the directions test in year 9, as well as the cross-line and "qrst" tests. She went at the tasks in a disorderly manner; frequently went back to correct herself; also gave up quite easily, though seeming to make good effort while she did try.

No outside history was obtainable. Nothing of a psychopathic nature was either related by the patient or observed in her behavior. There was good evidence, however, that she had been growing careless in her choice of associates and unmindful of risks she took in her conduct with them. She made the impression of a person who would readily take on the color of the environment she might be placed in. The psychological view was that irrespective of any charge against her the test rating and the disorganized character of her mental processes pointed strongly in the direction of special supervision. Recommendation was made of a disposition which would provide for the patient regular contact with the Out-Patient Department. Supervision of a similar type was provided through probation, to which the patient adjusted very well; affection for mother proved a good motivation. At last accounts she was married and living happily.

Case XV. A man of 25, an illegitimate child of parents under 18, adopted into an economically upper middle-class household. Some kindergarten instruction between ages of 5 and 6; later some private instruction. Never learned well. As a boy, earned a little money selling papers and running errands; now earns about \$10 a week doing janitor work, but never self-supporting. It is complained that he accosted two little girls on the street, followed one of them to her home, and used obscene language to her. Upon arrest, was referred to the hospital by the jail physician.

An initial Stanford examination of four tests per year yielded an IQ of 94, but a fuller examination yielded an IQ of but 76, and this is more consistent with a Myers Mental Measure score of 37 points (mental age, 11 years) and with an inferior performance test record, scattering in age scores from 6 to 14 years, with slight learning ability. Coöperation was good, with anxiety to make a favorable record. The Kuhlmann score corresponded to an IQ of 78, but there were abnormal features in that he could do nothing with the cross-line test and was one of the very few who failed the "qrst" test; while in "unfamiliar forms" he simply repeated in later figures slight variations in the figure first shown him.

Developmentally he was slow in walking and talking. Had temper tantrums. Enuresis up to about 14. Was considered a "nervous" child, but got along fairly well with other children of the neighborhood. Was called "crazy (Jake)" because he used to have

trembling spells on the street. The psychiatric impression was one of psychopathy rather than deficiency. The psychometric ratings did not justify a clinical diagnosis of feeble-mindedness on intellectual grounds; but he is one of those cases of social feeble-mindedness who cannot adjust in the presence of psychometric ratings commonly adequate thereto. He was returned to jail as "not insane, mentally deficient." He was sent to one of the state feeble-minded schools, where he has adjusted very well, is described as a good worker, good disposition, neat about his person, amenable to discipline, "a typical feeble-minded boy"(!). The diagnostic impression should be understood in terms of social adaptability rather than what is ordinarily meant by the term "feeble-mindedness" in psychological usage.

Case XVI. A woman aged 19; mother died during patient's infancy; has not lived with father since she was 5 years old. Several adult siblings. Schooling irregular, but reached fourth grade at 8 years. Is a former patient and comes on advice of staff for further study, with endocrine reference. Has been unstable in behavior, with temper outbursts, quarreling with a neighbor and starting to run away with a vague idea of "ending it all." Has been depressed, with refusal to eat.

Stanford examination on previous admission 18 months before showed IQ of 67, limited apparently by psychiatric conditions at the time. The same test on the present admission speaks of willing coöperation but much retarded responses. The score is just average adult; IQ 88, with scatter of five year levels. The Kuhlmann score, on the contrary, is equivalent of IQ 64 and apparently reflects the greater weight given to the time factor in the Kuhlmann tests, the retardation of the patient's responses affecting the score more unfavorably. The Stanford successes were mostly of a formal "language" type, which capacity is discounted in the Kuhlmann tests. These were uniformly at a lower level, and did not scatter so much as the Stanford. No test was passed at an average adult level and but three scores within normal limits. The case is a good illustration of the point made by Plant on the comparative features of the two scales. The records indicate good intelligence, the deficiencies being secondary to the psychiatric disorder.

The mental symptoms occur on the background of an endocrine disorder, probably hypopituitarism. Difficult marital situation;

in the hospital emotional depression was overlaid by apathy and dullness. There are some schizophrenic-like ideas of "reference" and mind reading, also compulsive ideas. The physical anomaly and atypical personality were not felt to augur well for satisfactory adjustment independent of custodial care. The patient was transferred "unimproved" to another institution.

CHAPTER SIX

GROUP TESTS

Rôle of group tests in clinical practice — Types of group tests — Group tests in the study of delinquents: Administration — Group tests in the study of delinquents: Findings — Group tests in individual examination

Rôle of group tests in clinical practice. The direct rôle of group tests in clinical psychometrics is limited, but indirectly it is considerable. Many data essentially useful in the interpretation of test results, such as adult age norms, occupational standards, and the like, we owe to group tests. From this standpoint one is quite justified in discussing their chief features. All of present concern are "intelligence" tests; that is, they yield a rating which is comparable to the intelligence quotient. The uses of group tests most nearly related to the present subject have been (1) examination of pupils or students with a view to selecting for individual study any whose records especially indicate it, (2) measurements undertaken in institutions for dependents or delinquents (also to select persons for individual examination), and (3) tests given to single persons where a record is desired, but the problem is not such as to call for the more elaborate procedure of the Binet type (e.g., adults of good average ability).

Types of group tests. The first group test to achieve prominence was the Army Alpha (49, 58-79). It consists of eight sections, themselves rather confusingly known as "tests," each containing from twelve to forty items of response. Brief time limits, from $1\frac{1}{2}$ to 5 minutes, are allowed for the accomplishment of each of the eight sections, and on the basis of the amount accomplished a point score is computed which can be translated into units of mental age or intelligence quotient. The distinctive feature of this type of test is administrative. It is adapted to groups of considerable size under the control of a single examiner for a

time that is equal for all. Tests like the Alpha, where definite time limits are assigned to special sections of the test, are termed by Freeman "segregated."

A second type of group test uses items similar to those of the Alpha, but instead of putting together all the items of each task, as does the Alpha in its various sections, it intersperses them one by one. Thurstone's Test IV is one of several prominent tests of this type. One advantage claimed for this variety of test is that the score on a single type of task will not be vitiated by some chance distraction; if such occurs, it will affect them all equally. Also such a test makes far less demand on the examiner, who has no frequent time limits to look out for nor such details of discipline to maintain. On the other hand, the continual shifting of the experimental task from one item to another (as from information to arithmetic) has been thought objectionable.

Tests of this kind are sometimes called "self-administering," because it is necessary only to give the blank to the subject and let him work on it, without "cribbing," for whatever time limit may be fixed or for what time he takes to complete the test (50, 2, footnote). This makes them convenient where ratings are desired on many persons, who may be, however, inconvenient to assemble at the same place and time, as some industrial applicants. Another name sometimes applied to this form of test is "spiral-omnibus" (51, 13).

In sectional time-limit tests it is a convenient matter to profile the results of the different sections. One can represent how well the subject did compared with others in the directions, judgment, analysis, or information sections of the Alpha test. The Appendix gives a table for doing this. This advantage is lost in a "spiral-omnibus" test because the items of different sections are interspersed. Morgan has recently described a way out of this difficulty, with a view to preserving advantages of both types of test (52).

The demands of military psychometrics gave the first impetus to group tests independent of language. The "Beta" test resulted (49, 79-92), and others have since been put forward, notably by Thorndike. The most recent addition to this group is Myers' Pantomime Intelligence Test. The language difficulty may be illiteracy, ignorance of English, or both. Army Beta and the Myers Pantomime are aimed at both these, though illiterates are probably always at some disadvantage in a paper-and-pencil test. The Myers Mental Measure (53) occupies a midway position. It requires no language responses, the record form contains no language material and to that extent is suitable for illiterates, but it does require the understanding of spoken English instructions or whatever language is used in giving the test. It was devised for educational use, and perhaps no other group test covers so wide a range of capacity — kindergarten to superior adult.

Examples of the various types of group tests described above may be summarized as follows (cf. also 8, 166-168):

VERBAL OR MAINLY VERBAL

SECTIONAL TIME-LIMIT	SPIRAL-OMNIBUS (Self-Administering)	PICTORIAL
Army Alpha Test National Intelligence Tests ¹ Thorndike Collegiate Examination Terman Group Test of Mental Ability Scott Mental Alertness Tests: Series I Otis Group Intelligence Scale	Otis General Intelligence Examination Otis Self-Administering Tests Thurstone Test IV Morgan Test VI (Carnegie)	Myers Mental Measure Myers Pantomime Intelligence Test Army Beta Test Scott Mental Alertness Tests: Series II Thorndike Detroit First-Grade Intelligence Test ²

Some early intelligence tests adapted for group use (cf. the Woodworth-Wells tests and a pre-war test used by Scott for

¹ This and the Otis tests are especially adapted for school use.

² For sources of this material, cf. *Bibliography of Tests for Use in Schools* (World Book Company). A comprehensive survey of the material is also provided by Freeman (9 a, 181-190). Cf. further *A Manual of Standard Tests*, Kansas State Teachers College of Emporia, Bulletin of Information (1926); 35 pages.

salesmen) utilized responses consisting of written words. To this are the two objections of the physiological time of writing the words and the cumbrousness of scoring. The Trabue Combination Test is now the only important test with written words, though this principle appears also in Thurstone IV. Check marks are generally employed, usually underscoring or crossing out (Pressey); numerals or letters are used where appropriate. Tests which bring the responses as nearly as possible in the same vertical column are much more readily scored. The Army Alpha gives good illustrations of this. Otis has rigidly applied this principle in various tests devised by him.

Scoring by amount limits ("When you have finished, give the paper to the examiner") used also to be common, but is now largely superseded by time limits. These are sectional, as in the Alpha, or total, as in the Otis General Intelligence Examination (optional) or Thurstone IV. A leading representative of the amount-limit type is now the Thurstone Examination in Clerical Work. Where it is desired to study various disparate and rather complex tasks self-administratively, such a form is all but requisite. How far it is practically necessary to use so elaborate a procedure for gauging clerical ability is another matter. The scoring is cumbrous, and the test is inconvenient to use with a group simultaneously because subjects finish at different times.

In the beginning of mass testing some concern was felt about invalidation through coaching or other foreknowledge. Protection was sought through establishing alternate forms of equal difficulty. Five such forms were established for the Army Alpha. The writer organized some brief tests with ten alternate forms, which were utilized by Miles (54, 190) in certain studies of learning and transfer. Thorndike has made a similar study of an alternate pictorial test. Actually coaching has not yet, at least, proved a difficulty of sufficient

importance (55) to justify most authors in putting out tests in more than two alternate forms. From this standpoint such tests as those cited may be regarded as alternate forms of each other (49, 133-134, 228-229).

Group tests in the study of delinquents: Administration. Aside from educational psychometrics, the chief contribution from this standpoint has been that of Doll (28, 57, 58). Doll had the problem of devising an examination system suitable to state institutional requirements of New Jersey, more especially prison population. He recommends that at regular intervals (e.g., monthly) a group intelligence test be made of persons admitted since the previous group test. Immediately following this each prisoner should have individual study to gain whatever light psychometrics can throw on his future adjustment. Administratively he classifies the bearings of the inquiry under seven heads: general mental level and constitution, transfer on basis of defect, school educability, vocational educability, responsibility, industrial placement, relation to parole. The interlocking of some of these items is apparent. Considerable stress is laid on the different test levels attained by various social classes and nationality as affecting judgment of subnormality. The range of tests utilized was wide, but from a placement point of view the procedures then available were more suited to the gauging of general occupational level than fitness for particular types of industrial work. A general intelligence test of one of the briefer types, supplemented by a group of the more specific occupational measures that are being organized, would probably now be the preferred practice.

Doll reported, for his group, intelligence scores considerably lower than the average; but, discounting selectional factors, he believed that the intelligence levels corresponded closely to the average for the community generally.

Suggestions are offered on the administration of psycho-

metric work in other institutions where problems of clinical psychology are likely to arise. He has some faith in the group test as the means of disclosing, qualitatively, individuals requiring special study for reasons not evident in their scores. The present writer has seen rather too many normal performances by psychotic persons, even in individual examinations, to rely greatly on group tests in this respect. The extremes, however — upper 5 per cent to 10 per cent and lower 10 per cent are suggested — are likely to repay individual study, and the group test is the natural means of selecting these. Both language and non-language tests he considers should be available, and where there is much discrepancy the distinction of "verbal" and "manual-minded" may be possible. The form which such supplementary individual examination takes is open to some discussion. The problem is different from that of adults in prison or industry. It is not clear that particular vocational aptitudes differentiate, accessibly to psychometrics, prior to the high school period, and Doll also doubts the wisdom of making such early symptoms a basis of vocational "diagnoses."

A scholastic program can be laid down with more confidence from early psychometric evidence. Reasonable predictions can be given of the curriculum one is likely to be able to assimilate (8, 230-282). It is also possible to arrive at conclusions regarding the general occupational level, but hardly on types of occupations within that level. In the later high school and in the college years, on the other hand, definite vocational bents, where they exist, are probably crystallizing, and it is the part of every wise educational program to bend the resources of psychometrics to their discovery.

Group tests in the study of delinquents: Findings. A comprehensive survey of the facts has been lately reported by Murchison (59). Burt also gives special material on intelligence and juvenile delinquency (19, 184; cf. also 9a,

427-443). The former investigator brought together from various sources, mostly original work, a considerable body of material on intelligence-test reactions in persons convicted of crimes. His findings do not support the view that criminality (using this term synonymously with conviction for crime) is especially associated with subaverage intelligence. In general the criminal scores range higher than the army samples, and while Murchison is reluctant to accept the latter as typical, the former also represent only that portion of the delinquent element failing to elude the none too vigorous grasp of American criminal law (60). The same situation appears when the data are analyzed geographically, to guard against errors arising from different origins of the normal and criminal groups. The discrepancy is especially marked in criminals confined away from regions of origin; "Not a single state . . . sent a draft quota . . . which could compare mentally with the criminals from west of the Mississippi and confined in Eastern prisons." Data are presented on the levels of intelligence found in various types of crimes — the order in a descending scale being fraud, force, thievery, statutory,¹ physical injury, social dereliction,¹ sex. The conclusion on recidivism is that the superior and subaverage are more likely to return than the average.

The special finding is reported, that the schooling of the criminal is less than that of the normal groups. In connection with the opposite situation for intelligence scores, it possibly denotes an unfavorable reaction to educational restraint on the part of those later developing more clearly defined anti-social tendencies. Occupational analyses tended in the direction of relatively favoring the criminal group in certain skilled trades; but in at least some of the cases the army groups may not scale as high as in the population at large. Interesting relationships are reported between religion and

¹ These terms are more fully defined in Murchison's contribution.

types of crime, but the causal situation is not clear. Inspection of the tables suggests that tied up with this situation is the relation between schooling and types of crime. No special relation appears between intelligence scores and length of confinement, but this connection is complicated by the relation between intelligence and type of crime. It is a question whether the crimes given longer sentences are not in considerable measure those associated with the upper intelligence levels. Murchison's findings may be compared with observations of the army "conscientious objector" group collated by M. A. May (61). The objectors rate distinctly higher than the white draft in general. It is a reasonable supposition, one supported by these findings, that social conformity is somewhat less likely in those of above-average mental organization than in those of less complicated minds. Obviously it *requires* less intelligence to conform than to revolt. Above-average intelligence leads only too readily to questioning of the existing order, though superior minds are generally unlikely to do this in an anti-social way (16).

Group tests in individual examination. The obvious disadvantage of such a procedure is the loss of nearly all the qualitative data which accrue in a standard interview like the Binet scale. This has been nearly sufficient to exclude group tests from practical clinical use. Sight should not be lost, however, of advantages which group tests have in this connection. As a means of deriving an "intelligence" score they should often be superior to individual tests, for the "group" and "individual" tests are such not only from the point of view of administration, but from the point of view of devising. The individual tests are all descendants of the Binet scale, and its revisions have been under the authority of single persons — Kuhlmann, Terman, and Herring. The typical group test is descended from the Army Alpha,

with work of Arthur S. Otis in an avuncular relationship. The Alpha, as is well known, grew out of the united efforts of a considerable group of those then the most interested in psychometric work, and those who took part in them may well appreciate how much was essentially the result of this coöperation. The group tests are generally better-organized psychometric methods than the individual. Mass data are easier to accumulate and standards easier to fix. The subject's performance is less affected by the examiner's personal skill. The subject's interest is greatly stimulated by scoring the test in coöperation with him just after it is made. Accordingly, where the psychometric score is the essential factor and the subject is of sufficiently well-ordered behavior to warrant it, much can be said for the individual use of group tests. The profile for various test functions obtainable for such tests as in the Alpha is of further interest. As a rule there is a definite choice in any single examination between individual and group test methods, and choice should be made with the above considerations in mind.

REVIEW QUESTIONS AND EXERCISES

1. What are the main functions of group tests in relation to clinical psychology?
2. Into what three main classes do group tests of intelligence fall? Describe at least one example of each.
3. Discuss the application of psychometrics to a prison population.
4. What has been ascertained about the relation of intelligence to antisocial conduct?
5. Name advantages and limitations of a group test used for individual examination.
6. The students should take two or more of the principal group tests, scoring their own records to the instructor's dictation.

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CHAPTER SEVEN

PERFORMANCE TESTS

Performance tests as forming a general scale — Relation of Binet to non-language tests — Single tests of the non-language type: the Porteus Mazes — The picture completion tests — The Dearborn Formboard No. 3 — Simpler tests of the formboard or construction puzzle type: the Seguin formboard — Healy A — The diagonal test — the triangle test — Formboards as learning tests — The Knox Cube Test

Performance tests as forming a general scale. The dependence of the Binet scale and its derivatives on language is commonplace. Not only are directions necessarily given in terms of language, but responses must be through the same medium. There is nothing essentially faulty in this, because language is the natural overt expression of a most important type of mental activity, conventionally termed "thinking." If it is desired to measure a person's ability to think, it is natural to do so in language terms. Practical situations limiting the value of language tests are the need of psychometric work with (1) persons not having command of the language in which the tests are given; (2) illiterate persons who, not having had the usual training in manipulating ideas, give a false picture of their personality in responses to language tests; (3) persons of the so-called "verbalist" type who have special ability with language that is also out of proportion to their remaining personality, and, on the other hand, the tongue-tied (14, 182), of whom the converse would be true; and (4) the deaf.

When these difficulties in the use of the Binet series became apparent, tests were developed in which the rôle of language was much diminished. These received the name of "performance" tests, a word not more descriptive than the name "intelligence" tests, since every test reaction is a performance, whether with linguistic or other material. As

they originated in efforts to obviate the language difficulty, they may also be spoken of as "non-language" tests.

Such tests are strictly non-language in the sense that the experimental material consists of objects, not words, and the response consists of manipulations of these objects, never of words. On the other hand, the directions are uniformly given in terms of language where it is understood, as this is the more natural procedure (2, 22). Most of the tests *require* no language for their explanation. Some, however, such as the Healy Picture Completion Test II, would be relatively difficult to explain without its use.

Performance tests originally served as substitutes for the Binet scale where the language factor vitiated the latter. As such, it was natural to organize them into a series that would give a mental-age score analogous to the Binet series. The ground-breaking work in this field is that of Pintner and Paterson (2). Baldwin and Stecher (48) offer an advanced treatment from the point of view of the pre-school child.

Examination of Pintner and Paterson's work discloses a basic difference in the organization of the two methods. Thus the Stanford scale consists of some sixty tests, mostly attaching to one year level only. The Pintner and Paterson scale consists of fifteen tests, but most have norms from pre-school age to relative maturity. A subject receives a mental-age rating in each test, and though other evaluation is possible, the median of these mental age ratings is the most convenient representative of the mental age score (8, 124).

The Binet series can claim over this scheme the advantage that it observes the reaction to a greater variety of experimental situations,¹ but the non-language scale has the counter-argument that its situations approach closer to actual life tasks. The average school child may respond more eagerly to the Binet than to the non-language type of tests. It is doubtful if this is true of any other group that comes

¹ Cf. page 66.

to psychometric notice. Most groups coming to clinical attention make a readier and more interested response to non-language tests. This is not conclusive evidence that non-language tests are more serviceable from the standpoint of diagnosis, but it is a factor tending in this direction.

The Binet scale and its derivatives form a practically closed system. The non-language tests do not. The original scale of Pintner and Paterson may be expanded and varied indefinitely by standardizing new performance tests whose range extends over a number of year levels. This gives a wider choice among these tests. Today there may be twenty serviceable non-language tests standardized for different year levels. Ten or more of them yield a score reasonably comparable with a Binet rating.

Relation of Binet to non-language tests. There are available comparatively few systematic studies of the performance tests as related to ideational tests of the Binet type. Leaming has made perhaps the chief contribution from this angle (62). She distinguishes types who do well or poorly in both or either sort of test. A uniform relationship between them, as between two ideational test series, is not to be looked for. Kohs has collated various data on this point in connection with his own excellent block-design test. This shows with the Stanford the unusual correlation of .83. Performance tests used in the army are found to have correlated from .48 to .78 with the Stanford. The authors do not cite the relationship of individual tests, but find a correlation of .84 between the standard group of five of the army performance tests and the Stanford (49, 20). Johnson and Schriefer (63) report results on this topic with New York City school children. Tests of the Pintner and Paterson scale yield a correlation of .82 with the Stanford. It is stated that high Stanford ratings betoken high performance ratings more frequently than the converse.

The harmony of these results is a fair indication that the performance tests available yield a scale whose general score may with normal individuals be used as a substitute for one of the more convenient Binet type where the latter is unavailable. In the present clinical setting such a procedure has been less satisfactory. The variability of single test scores is too great. On the opposite page is a tabulation of mental-age scores in a group of principal non-language tests of fifteen unselected persons who were patients. The figures bear out those of Durea with delinquents (64, 86-98) showing maximal performance variations among individuals of similar Stanford ages. Mateer, while conceding that the "well-rounded" individual will score at a similar age level for either class of measurement (17, 186), doubts the basic comparability of the two types of tests.

In general, relationship between the two findings would vary greatly with the class of persons who yielded the measures. If one refers to the cases cited on page 119, one observes that the median performance rating often differs from the Stanford but insignificantly, and occasionally the discrepancy is wide. Performance scales cannot be used as substitutes for the Binet in the sense that they measure the same things. One is fundamentally a test of thinking and the other of doing. As a guide in scholastic prognosis in an English-speaking child, few would not prefer a Binet to a performance rating. But this is not the usual function of this scale in a clinical setting. It is rather to give evidence of a patient's general adaptive capacity. In this rôle the two types are equally legitimate, and the examiner's problem, in the case of choice, is to decide which type of measure has a greater weight in a particular case; or if the two measures are discrepant, what this discrepancy means for the management of the case.

Exaggerated claims made for the Binet type of testing may

SUBJECT	PORTUS MAZES	CUBE IMITATION	GODDARD ADAPTATION	MANIKIN	GODDARD FORMBOARD	MALE AND FOAL	DIAGONAL	SUBSTITUTION	TRIANGLE	HEALY P.C. I.	CUBE CONSTRUCTION	DEARBORN FORMBOARD	HEALY A	HEALY P.C. II.	FEATURE PROFILE	LIFE AGE	MENTAL AGE	PERFORMANCE AGE	RANGE
A		12	6.5	max.		max.	8	9	11	15.5	12		max.	10	10.5	12-4	7-8	10.8	6.5-15.5
B	10	9		max.		max.	max.	max.	max.	max.		9	13	10	max.	20	13	13	9-max.
C				5		max.	max.	max.	6.5	max.		14.5	8.5	10	max.	18	14-3	10	5-max.
D		7	8	max.	9	8	14	min.	max.	max.	min.		14.5	13.5	max.	15-10	10-8	14.5	7-max.
E	8	5.5	6.5	8	max.	max.	13.5	12	max.	8			8.5	min.	min.	9	6-8	8	min.-max.
F	14	13				max.	max.	max.	max.	max.	15	15	max.	min.	11	13-2	9-6	13.5	min.-max.
G	13.5	max.					max.	max.	max.	max.			max.	11.5	11.5	12-8	14-6	15	11.5-max.
H	4	5		5	5.5	min.	max.	max.	max.	max.			max.			7-6	6-8	5	min.-5
I	14	13			12	max.	8.5	max.	max.	max.			max.	12	max.	14-3	13-9	15	8.5-max.
J	6	5.5		8	8.5	8.5	min.	9	max.	8.5			max.			12-3	9	8.5	min.-max.
K	8	5.5		8	max.	13.5	max.	max.	max.	max.	9	14.5	max.	9.5	max.	20	10-9	13.5	5.5-max.
L	10	7			13	9	max.	9	7	6.5			8	min.	max.	35	11	13	6-max.
M	9	7		max.	11	9	max.	7	max.	max.	9.5	7.5	min.	min.	min.	14-10	10	9	7-max.
N	7.5	7	8	8	max.	12.5	max.	max.	7.5	max.	15.5	10	max.	max.	max.	20	10-9	9	min.-max.
O	12.5	max.				7		6.5	7.5	max.			min.	max.	max.	16-6	12-6	max.	7.5-max.
P	7	6	8							11.5			min.			9-3	8-7	7	6-11.5

In the columns "mental age" and "life age" the figure after the hyphen denotes months. For the preparation of this table the author is indebted to Miss Esther Beckwith.

have had value for getting the method "across" for what it is actually worth; from an objective standpoint the criticisms adduced by Dearborn and his colleagues are very pertinent. "One cannot differentiate between *grades* (65, 12) of intelligence on the basis of materials employed as, e.g., between the handling of 'things' or 'ideas,' whether the latter are said to be concrete or abstract, or between the handling of things and the symbols of things, such as words or numbers." The material is not the same, nor are the same traits being measured; but they are traits of comparable importance in life adjustment, of which now one may be the more important, now another.¹

Dearborn, indeed, stressed his finding that the performance tests involved do not differentiate satisfactorily past the ages of 9 or 10 years. This is a more conservative view than appears in the work of Pintner and Paterson, or of Porteus, or of Healy. Porteus found the "ceiling" of the original maze tests at 14, while Healy Picture Completion Test II will probably function as high as any individual psychometric test. The reason why the "ceiling" of ideational tests is higher than for performance tests lies in the natural pre-occupations and interests of those most concerned in the construction of tests. As Healy points out, the construction of high-level performance tests is a matter calling for unusual resources of time and ingenuity, and few workers are tempted thereto away from the facile manipulations of the linguistic and graphic. Dearborn draws the comparison along lines of visual and auditory mental types, as contrasted with the kinæsthetic, and cites Pear's (66, 205-231) discussion of the latter from an ethical standpoint.² The army data show the

¹ L. S. Hollingworth (119, 190) considers that the relationship between the ideational scales and the mechanical tests of Stenquist is represented by an r of "about 40."

² One may cite in this connection a tendency to choose as eminent, men of thought rather than of action.

skilled trades rating considerably lower psychometrically than the clerical occupations, but to assign to one a "higher" type of mentality than to the other, or one in any way denoting superior life adaptations, is fantastic. No general statement should be made as to whether the ideational type of measure (language, visual, auditory) is more significant for life adaptation than the concrete (performance, kinæsthetic). It is so much bound up with the whole philosophy of values. The significance of these abilities will vary greatly among different individuals, and this it is the examiner's business to interpret.

The spread of scores in a series of performance tests is analogous to the "scattering" of Binet scores already mentioned. As scattering diminishes reliability for a Binet rating, so it does for ratings of non-language tests. But the spread of non-language ratings is often so great as to preclude age ratings with much show of reason.

For giving and scoring the principal non-language tests, it is important to have the essential directions and scoring norms as readily accessible as possible. The published sources of this material are various. To meet this difficulty the writer has arranged for the laboratory the essential directions and scoring norms for each test on a sheet of letter-size paper; all together sixteen such sheets were prepared. Mimeograph stencils were then made of these, and on being collated these stencils constitute an elementary manual for administering the tests. On the following page is shown the record form for the administration of a series of performance tests.

BOSTON PSYCHOPATHIC HOSPITAL

PSYCHOLOGICAL LABORATORY

SERIES 8

PERFORMANCE

House

Name.....Birth-date.....Date.....O.P.D.

Foreign Lang. Diff.; None; Some; Marked. School Grade.....at.....Yrs.

Occupation.....Willingness.....Effort.....Phys. Act.....Speech.....

Examiner.....

...Porteus Mazes; 3—4 —5—6—7—8—9—10—11—12—14—A-I—A-II.

...Cube Imitation; A	1234	B	1324	E	13243	H	143124
X	12343	C	1432	F	14324	I	132413
Y	12342	D	1423	G	13124	J	142341

...Cube Construction; (1) Moves..... (2) M..... (3) M.....
Time..... T..... T.....

...Kent-Kohs; 1.... 2.... 3.... 4.... 5.... 6.... 7.... 8....

...Dearborn (1) Time..... (2) T..... (3) T.....
Formboard; Moves..... M..... M.....

...Healy PC—II; I VI

II VII

...Lincoln Square; III VIII

IV IX

...Substitution; V X

...Goddard
Formboard; 1..... 2..... 3.....

...Triangle; (1) Time..... (2) T..... (3) T..... (4) T..... (5) T.....
Moves..... M..... M..... M..... M.....

...Diagonal; (1) Time..... (2) T..... (3) T..... (4) T..... (5) T.....
Moves..... M..... M..... M..... M.....

...Healy—A; (1) Time..... (2) T..... (3) T..... (4) T..... (5) T.....
Moves..... M..... M..... M..... M.....

...Healy—B; (1) Time..... (2) T..... (3) T..... (4) T..... (5) T.....
Moves..... M..... M..... M..... M.....

...Manikin;

...Mare and Foal;

...Goddard Adaptation;

This is a group of tests from various sources in which language ability is a minor factor.

Single tests of the non-language type: the Porteus mazes. This, of outstanding importance in non-language tests, uses a series of twelve diagrams, of increasing degrees of complexity. The first two, adapted to 3- and 4-year levels, involve mostly attention and motor coördination and require no special prevision. Their chief use is for adaptation purposes, particularly with young children. The 5-year test is the simplest maze, and in present laboratory practice is also useful for instruction chiefly. It differs from the succeeding mazes in having a superior and inferior solution, whereas the others, except perhaps year 9, have but one solution. It has accordingly been found convenient to replace this maze for instruction purposes with one designed as in the accompanying cut. This presents more nearly the



problems encountered in the complicated mazes. The instructions prohibit tracing in the air above the mazes; also removing the pencil from the paper after beginning. The latter provision increases difficulty a good deal, since the hand holding the pencil tends to obscure part of the maze. The subject should be warned of it before beginning, as it will be confusing to be unexpectedly corrected for this during the test. The rules governing the number of trials and the inversion of the mazes must be carefully observed. Directions and further comments on the Porteus Maze Tests will also be found in Burt's volume (19, 242 ff.).

The score was originally derived through adding the credits and half credits earned by the successes in the first and second

trials, or later trials where allowed. More recently Porteus has elaborated the scoring through penalties attaching to records which show a special amount of scattering (42, 108-112). This procedure probably shows to best advantage where the Porteus scale serves as a relatively unsupported criterion of general adaptive capacity. Where it is part of a system of several coördinate tests, as here, it has not seemed that this complication of the scoring was justified. The Porteus mazes are less convenient to administer than others of the performance tests, owing to the many blanks that are called for. It is hardly practicable to make up sheets for each subject, as one cannot tell in advance how many of each blank will be needed. For use in connection with the other performance tests here employed, the blanks for each year are enclosed in a similarly numbered letter-size manila folder, there being thus twelve folders for the entire series of test material. The arrangement is bulky, but convenient to manipulate.

Many advantages claimed for these maze tests over the Binet series are shared by other performance tests (42, 87). Independence of special experience is among the more distinctive features. Some thought has been given to formulating the mental traits chiefly entering into the tests. A group of defectives were rated for various personality defects, and these ratings were compared with the Porteus. The trait most nearly correlated with inferior Porteus success was lack of planning capacity (42, 98). It is found that the traits measured by these tests show a development disproportionate to the Binet series as mental normality is approached. Accordingly, in borderline Binet ratings the Porteus score may well be decisive from the standpoint of practical disposition. Porteus has made considerable use of the mean score of the two methods. This and other reductions of test reaction to quantitative terms are of course sound in principle.

The tendency in the writer's organization is somewhat against a fusion of psychometric scores. The aim is rather to keep in mind what the test reaction is in each of its salient respects, whether in Stanford, Porteus, Picture Completion, etc., and to estimate the proper bearing of each score on the understanding of the case.

Porteus has examined the correlation of the mazes with the Binet series for 476 boys and 467 girls, of ages from 6 to 13 years (42, 94). Rather different results are presented later on this point (42, 105). The average r obtained approximates .51; .47 for the boys, .56 for the girls. For the separate years the r figures range from .24 to .75. In general, boys score better than girls.

Relationships of Binet and Porteus scores to general personality traits are also presented. The mazes appear the better criterion of industrial and social capacities, the Binet much the better of educational capacity. Results obtained by Ross (67) are cited in support of these findings. This author apparently found a higher relationship (r .79) between Porteus and Stanford than that above cited.

In line with the previous observation is the unfavorable significance attached to a Porteus rating distinctly below a Stanford or allied score. Failure, remarks Porteus, is more significant than success, whereas the converse holds true in tests of the Stanford type (42, 201).

Cornell and Lowden (68) specially observed the behavior of the test in various types of unadjusted adults. While practically without significance for classification in the various diagnostic groupings, there was considerable tendency, most marked in the *constitutional psychopathic inferior* group, to test below the Stanford age. In this setting the method was more serviceable qualitatively, for the judgment of each case on its individual merits and from the standpoint of "temperament," than with reference to age norms.

Among the interesting features in the history of this test is its behavior when applied to the special type of mentality represented by Australian aborigine children. (It may be remarked that this race is reported peculiarly expert in tracing the path of a person who has passed through the forest.) In conformity with this the simpler mazes were solved to a relatively good degree, but this capacity broke down as the more complicated stages were reached. The suggestion lies near, to develop the maze idea on a more difficult level. Porteus is not especially satisfied with his attempts in this direction. He feels that the further complication increases the likelihood of accidental success; also that special visualizing abilities would be unusually favorable. The idea seems worth working out further, especially in respect to blind alleys longer than those found in the mazes from 5 to 14 years.¹

The picture completion tests. Among the longest tried of psychometric methods is that of "completion," the German "*Kombinationsmethode*." In its original form it dealt with language, the task being to fill in the gaps of a context with suitable words. This principle has been standardized in a well-known intelligence test, of which Trabue (68 a) is the author. In the endeavor to utilize it with non-language material, Healy published his first "picture completion test." It is too well known to need description here; for purposes of reference the name is conveniently shortened to "Healy PC-I." As a test distinctively embodying an important principle it was in favor for many years. With the advent of better types of picture completion tests and the appearance of certain defects in it, notably with adults, it has tended to fall into disuse. Its author has himself discontinued it.

¹ Two "adult" Porteus mazes are now available, issued, as are the others, by C. H. Stoelting Company, Chicago. W. F. Dearborn has also experimented with more difficult problems of this type.

From the strictly pictorial point of view it is fairly adapted to children, but less well to adults. The standardization by Pintner and Anderson (69) indicates that as a test it will at least bear comparison with other single non-language tests. It serves well for what industrial psychologists call the "shock absorber," a test given to accustom the subject to the relative novelty of the laboratory situation but not intended for a special rôle psychometrically.

A more advanced type of picture completion test is offered by Shaw (70, also 65, 33). Like the preceding, it illustrates a single scene (drug store) from which various pieces are cut out. The cut-outs are circular, instead of square as they are in the Healy tests, and this is thought objectionable by some. In complexity of situations it stands between the two Healy tests. From the standpoint of delineation it is somewhat clearer than either, being drawn on a larger scale.

Healy Picture Completion Test II is among the major psychometric achievements. Representing as it does a continued series of situations, each with an element to be supplied, it affords a much greater refinement in the selection of missing elements. This means finer gradation in the responses as they approach the optimum. In Healy PC-I, as standardized by Pintner and Anderson, few responses other than the best score more than 3 or 4 per cent of the maximum credit. A score depends essentially on the number of "best" responses made. Other responses score negligibly, and there is no penalty for absurdities. In Healy PC-II the values for the optimum moves are calculated by statistical methods. Those for less adequate moves are arranged according to judgment. Partially reasonable moves receive credits with more gradation than in PC-I, indifferent ones score zero, while absurdities are penalized five points each. It may be observed that the chance occurrence of such absurdities is sufficient to give a minus value to the lowest

quartile of 7-year-olds (71, 231). This differentiation of piece values cannot be expressed by the simple scoring table that suffices for PC-I. It is necessary to include the value of the sixty pieces for each of the ten pictures. Two such tables are available — one Healy's own, the other obtained under army auspices. For the present purposes the former seems preferable. The user of the test should prepare a copy of this table for himself. It will go easily in two columns on a single sheet of quadrille-ruled paper. Vertical rulings separating the scores for the successive pictures should be marked over, in a series of colored inks if desired. As now issued, the test is enclosed in a substantial wooden box ($11\frac{1}{2} \times 11 \times 1\frac{3}{4}$ inches); the picture is in two sections; the sixty pieces are disposed in rows of ten each, numbered on the back. The floor of the box bears numbers corresponding to the pieces. The order of the pieces, which is determined by definite considerations (71, 230), easily becomes disarranged. Preserving it serves also to facilitate the taking out of special pieces by number.

None of the picture completion tests are speed tests. Time limits are set, ten minutes for PC-I and twenty minutes for PC-II. The times are, and are intended to be, rather longer than most persons would spend on the test. It is meant to show the best a subject can do, not how well he can do it in a given time or how quickly he can persuade himself that he has finished.

The regular scoring norms for Healy PC-II do not include a group of 231 individuals educated beyond high school. Of these, 11 per cent made a perfect score (100 points) as against 1.2 per cent of a correspondingly mature portion of the other groups. Increasing age up to later middle life has a favorable effect on responses to the test, at least in superior individuals.¹

¹ Cf. the substitution and other tests (33, 192 ff.).

Healy suggests questioning "in suspected cases" as to whether the relationship has been really worked out or success is accidental. If the latter, the scoring is modified accordingly. Such questioning adds much to the understanding of the test. Thus a patient rationalized the correct window in Picture IV by remarking that the red roof matched the red of the book on the table. There is, however, room for personal equation as to where such questions are to be asked. If done at all, it is good practice to do it systematically, as described later (pages 152-165).

Rather special effort has been made to interpret this test in terms of conceptual psychology. It has been thought to meet the classical view of apperception, a "sizing up of a situation, interpretation of all aspects, each in the light of the other, a seeing into an immediate situation, however the latter may be presented" (72). In the ordinary understanding of these terms the test does this probably better than is now done by any standardized test. The test is here classified as one of *practical* judgment, because the judgment or apperception must be embodied in a concrete response. Common sense would rate this test high as a gauge of general adaptive capacity, although systematic data are meager. The capacity which is measured seems specialized in relation to ideational capacities as such, for Bronner reports low correlations between the present test and the Stanford. The coefficient is .33 for a group of 12-year-olds; for 16-year-olds but .10, or negligible. Nor does delinquency affect findings in general, although Bronner believes that in individual cases the defect so manifesting itself is very important. (Case V placed the figure of the crying baby of PC-I under the boy sawing the log; "he cut her.")

The Dearborn Formboard No. 3. This test has been used as in the army, procedure and age norms being derived from Yoakum and Yerkes. Dearborn and his colleagues have

recently published a slightly different series of problems for the same apparatus, including a problem in which five pieces are removed. They quote norms for the moves and time separately without norms for the combination which the army data give. It appears to compare favorably for age-level differentiation with the other tests among which Dearborn presents it. For practical purposes the mean of time and move scores may be serviceable.

The test is termed a "formboard." It involves the appreciation of relationships which, while formal, are more complex than is typical of the "construction puzzle" type of test and invite planning to a greater extent. In this it is comparable to the Porteus mazes. The formboard or the "construction puzzle" tests are here used largely as tests of learning or practice.

As with other performance tests, the material is uniformly wood. Excellent models have recently been made of cast aluminum. The change in material may make some difference in the norms, but hardly sufficient to outweigh the difficulties found with the original models in respect to warping and coming apart of the pieces.

Most workers with this test will hardly use it so intensively as to memorize the set-ups for the different problems. A plan of the problems must be in view when it is set up, and the setting up must also be screened from the subject's view. In the writer's practice the board is stored on a beaver-board tray $14\frac{3}{4} \times 11$ inches. On the under side of the tray are pasted plans of the four set-ups drawn to a large scale. In preparing the test the examiner holds the tray upright between the subject and the board, thus screening it from view, and with the plan of the set-ups in convenient view for himself (49, 109).

Dearborn advises that if the subject fails to complete the problem within the time limit allowed for credit, he be at once

shown the solution. This mitigates any embarrassment at the failure. The construction puzzle tests next described are also demonstrated, if failed, for the additional purpose of getting a learning curve.

It is useful also to separate the possible moves from those where the piece does not actually fit the board (65, 29), though this distinction does not enter into the norms.

Simpler tests of the formboard or construction puzzle type: the Seguin formboard. There is a considerable group of tests dealing with the relationship of objects on a more formal basis than that of practical judgment and less concerned with content or prevision. The archetype of these is the Seguin formboard, which has been variously adapted. Similar tasks in more complex forms are presented in the tests known to psychometric jargon as "Healy A," "Triangle" (Gwyn) and "Diagonal" (Kempf), etc. (cf. also 9 a, 107-117). Healy B is a still more complex variation of the same idea, approximating indeed the Dearborn Formboard No. 3. (It actually elaborates an idea suggested by W. F. Dearborn (73, 16).)

These tests appear to have been conceived as tests of ability in their particular fields, not as learning tests. Something of the kind enters into the Seguin formboard procedure, in basing the score on the shortest of three trials. For the most part the score is based on single trials, and age norms for all these tests are now available, those for Healy B being the most recent accession.

In clinical practice these tests were found unsatisfactory as age-level criteria (17, 452). Bronner years ago said as much of Healy A (74), and similar objections will attach to other tests of like organization. Bronner prefers to understand the test as one of ability to solve a particular kind of problem, involving formal relationships regardless of age. One encounters here the difficulty of variations in the scores

of Healy A and its immediate congeners, the triangle and diagonal tests. A single observation with such tests is of little value as a guide to the subject's psychometric abilities, though Healy A may well be the best.

The Seguin formboard has a long history, the main features of which are cited by Pintner and Paterson (2, 30-32). The philosophical comment by L. S. Hollingworth also deserves special mention (119, 43). From a psychometric standpoint the chief single contribution is that of Sylvester (75), upon whose work Pintner and Paterson base their form of the test. The procedure recommended is to have the subject stand during this test, "for only thus," observes Mateer (17, 96), "can he have use of muscle play sufficient to place all the blocks with maximal speed." Sylvester lays down certain conditions for the placing of the blocks which are readily memorized. Various arrangements will meet these conditions; a single arrangement which does so is illustrated with the stencil directions used for the test in the writer's laboratory. This arrangement is as follows, the bottom blocks being cited in the first line for each group:

oval	cross	star
triangle	lozenge	circle
rectangle	semicircle	diamond
	square	

As noted, learning is involved in the standard procedure for this test, Pintner and Paterson using the shortest of three trials. For the not unselected subjects of Sylvester a very regular age progression is shown. The relative parts played in this test by "perception of form" and "voluntary motor ability" are open to question. One may suppose that in early years the governing factor is perception of form and that in later years manual skill gradually assumes preponderance. Errors arise from failure to differentiate the form, which may

be regarded as a phase of intelligence, or from very transitory lapses of attention. They do not enter into the scoring, but most certainly do into the interpretation. The same may be said of the general approach to the task. The directions say nothing about the use of one or both hands. A subject spontaneously using both has a better "grasp" on the situation than if a single hand is used. It is more efficient in the motor aspect because it takes only half as many motions to get the blocks over the board, but it may not result in as quick performance because of its greater mental demands, which the subject may be unable to meet. The relation between one-handed and two-handed performance in this test is of some theoretical interest from the standpoint of attention distribution and ability in simple and complex methods for the same task.

The Seguin formboard regularly obtainable is Goddard's model, known also as the "Goddard formboard." It is necessarily bulky—more so than other psychometric material. The last model purchased is somewhat modified from the earlier.

Healy A. The first official appearance of this test is in Healy and Fernald's *Tests for Practical Mental Classification*. Moves may be classified along the lines suggested by them, which are quite applicable to the other tests of this type: (1) moves contributing to a solution, (2) moves not so contributing, from which a class of "obvious" absurdities might be further separated, and (3) repetition of absurdities. Each move may be recorded under one of the heads as made, their total being the entire number of moves.

Schmitt (76) scores the test on basis of time and error. An error is presumably a placement not contributing to a solution. Of such moves she finds there are eleven. When a test is made with less than half these errors, the subject is regarded as having planned. More than these are classed

as trial-and-error attempts. More than eleven errors indicate their repetition and failure to profit from experience. In Dr. Schmitt's material, increases in plan and decreases in chance approaches are enumerated with growth. Trial-and-error approaches vary irregularly. A time limit of ten minutes was set, longer than in more recent practice.

Bruckner and King (77) made a comparison of 8- and 10-year-old children's reactions to the test, in somewhat the same way as in the writer's present practice, repeating until "mastered" or until five trials are given. Median times are quoted for the first four trials of the groups, as follows:

TRIAL	1	2	3	4
8-year-olds	2 : 20	0 : 22	0 : 09	0 : 11
10-year-olds	1 : 09	0 : 15	0 : 07	0 : 07

There are actually various positions, eight according to the authors, in which the pieces may be placed for solution, and the authors were interested in the tendencies of successive solutions to preserve the same form as the previous ones. Over half made no change in the successive trials. From the point of view of interpretation, one might well value a varied method of solution as high as or higher than a routinely repeated one.

Bronner (74) objects to the nomenclature of Bruckner and King's study, on the ground that the test did not originate with Fernald and is or was not generally called a "formboard." The rhetorical difficulties of stating what a test measures appear clearly. The "formboard" — e.g., Seguin, Goddard — is regarded as a test of "perception of form"; construction puzzle tests, of "perception of relationship of form." Each can as reasonably be said to test both. The subject in a Seguin formboard test must certainly per-

ceive the relationship of the pieces to the form of the aperture in which it fits. And in the other case, perception of the relationship must underlie the perception of the form itself. Dearborn has actually used the term "formboard" to describe his complication of the "construction puzzle" idea; and the same may be said of Ferguson's tests (3, 57). When there is no more basic difference than between these types of tests, a five-syllable term has a losing fight against a two-syllable one.

Psychometric studies at this time were dominated by the Binet view that a test must be adapted to a certain age level. The above studies at least agreed on the point that the test does not fit this notion and helped prepare the way for the emancipation of non-language tests from the Binet tradition, which became effective in the work of Pintner and Paterson.

These investigators review at some length the principal work with this test, objecting, on the ground of subjectivity, to methods of scoring more refined than time and number of moves. They give a critical comparison of their results with previous scores. Their work established the test as a "psychometric method," as the term may now be understood. Among the refinements they introduce here as elsewhere is a standard placement of the pieces to be fitted rather than to let them lie at random. They also present their data systematically according to quartiles, a procedure whose excellence may not have been fully appreciated by all. Their norms have been standard for some years, median scores in time ranging from 131 seconds at 7 years to 30 seconds maximum. Recently another standardization has appeared on the basis of material gathered in Dr. Healy's clinic, by Lowe, Shimberg, and Wood (78). The material is large and heterogeneous and is also selected according to Stanford ratings. The difference in the selection of the groups and such minor variations as there may have been in the administering of

the test seem inadequate to account for the discrepancy between these norms and those of Pintner and Paterson. The difference throws into strong relief the coarseness of these tests and the impossibility of deriving refined distinctions on the basis of single performances.

The diagonal test. This and the triangle test following are variations of the construction puzzle principle. Apparently Pintner and Paterson's standardization is the only work on them of general psychometric significance. Both are of the same order of difficulty. The diagonal test bears the stronger resemblance to Healy A and may be identically administered. Pintner and Paterson report median times ranging from 275 seconds at 5 years to 25 seconds maximum. The test appears to be slightly easier than Healy A.

The triangle test. This test has substantially the same range in difficulty as the diagonal test. The rectangular portion is ordinarily accomplished at once, and the difficulty centers on making the large triangle of the two smaller ones. In the beginning all the triangles are laid beside one another, which emphasizes their equality in dimensions. It is, however, very frequent for a subject, failing to fit one piece, to try to fit another one exactly similar in the same way. The test seems to offer larger possibilities of chance success than the other two, yet Pintner and Paterson norms show more regular behavior than for the diagonal test and about the same situation as for Healy A.

A formal improvement over these construction puzzle tests is the Lincoln hollow square (65, 32-33, 56-59), which provides solutions of graded difficulty for the same cut-out space, eight problems in all. An important accession to this type of test has recently been made by Kent in the Worcester Formboard Series (65 a), which effectively combines the principles in the formboards of Seguin, Witmer, and Ferguson. It deserves further standardization. Kent also

offers a modified form of the color cube test devised by Kohs, adapted particularly to the juvenile clinic.

Formboards as learning tests. There still appears concern over the "age-level" characteristics of the single test. It may be pointed out that the age-level character of the test is not an "all or none" matter. A test may be an age-level test either (*a*) as showing progressive changes with age or (*b*) as showing a critical stage where its progress assumes a new level. This distinction embodies the already mentioned issues between the Binet and the point scales. There must be very few good age-level tests in the latter sense. In the former sense most tests do improve with growth — Healy A is one of them — but the rate of growth will not be regular or smooth in different persons. Hence it is rather idle to talk about age levels as expressed in results of isolated tests. When one takes together ten or more performance tests or thirty or forty Binet tests, their ensemble will give a serviceable idea of the person's intelligence status. In this sense only are age norms for such tests significant, though this significance is real. From this generalization certain performance tests, such as Healy Picture Completion Test II, Porteus Mazes, and Kohs Block Design, should be excepted. Their scores may receive weight not incomparable to that of an entire scale of the Binet type.

It was just this erratic behavior of the construction puzzle tests on a gross score basis that led to the endeavor to get more from them by using them as a learning test. One advantage of this method is its use with those who fail the tests as commonly administered. It is then practical to go through the performance in the minimum of moves, then at once reset it before the subject and observe his reaction under these conditions. Occasionally one observes excellent performance at once, much better than repeated trials of persons who are able to score an initial success spontaneously.

Special References for Chapter VII in Addition to Those Cited
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CLINICAL MATERIAL ON PERFORMANCE TESTS AS CRITERIA
OF "INTELLIGENCE"

Case XVII. A girl of 16, second of five children including half-siblings. Reached sixth grade at 14, repeating one grade. Did not react well to school discipline. Then earned \$10 weekly in factory, but did not hold position. The complaint is of sex promiscuity, assaults by stepfather, also of theft of clothing. Referred by social agency for examination (question of defect) and recommendations.

In Stanford examination she scored an IQ of 84, with little scattering and coöperation well above the average. Although no language difficulty, she showed to better advantage in the less linguistic tests, and various performance tests were made. To these she reacted very well, enjoying them, commenting, for example, "Gee, this is fun!" In the various formboards she worked methodically, making very few false moves, and showed good learning ability. These scores were maximal for the most part. In both the Healy picture completion tests she had superior adult scores, making but one slight error in Test I and scoring no credit below 4 on Test II.

The laboratory has experimented with a development of the ball-and-field test, in which a paper is placed over a board with a $\frac{1}{8}$ -inch hole drilled in it somewhere, and the subject is told to trace with a pencil on the paper until he "finds" the hole, when it punches a hole in the paper. It seems to be harder than the ball-and-field test; that is, well-educated adults will do "inferior plans" for it. This patient made a most excellent methodical approach. Non-language test scores are so much higher than the Stanford as to indicate a different level of capacity for the two types of task involved.

As above implied, the domestic situation is inferior; home is unhappy, stepfather not supporting family; accuses mother of infidelity; she works daytimes and has little supervision of patient. There was also some psychiatric question as to how frankly she was facing her difficulties. The patient makes the impression of being easily influenced; has probably made considerable response to her inferior environment and conversely holds the prospect of better adaptation in a well-selected foster home. Her attractions were sufficient in the presence of her history to call for rather special safeguarding, but she was not regarded as an institutional case. No katamnesis.

Case XVIII. A boy of about $12\frac{1}{2}$ years, much the oldest of three children. Of foreign birth; came to this country 4 years ago. Now in the fifth grade in school. It is complained that for some months the patient has been associating with a group of older boys having some reputation for minor delinquencies. Tantrums if not allowed to go out evenings. Stays out till midnight; accounts of stealing vary. In court patient diplomatically managed the mother's ignorance of English so as to be brought to the hospital instead of undergoing disciplinary measures.

In Stanford examination he was coöperative and alert, answered promptly and with some vivacity. His attention was good, but the understanding of directions was apparently limited by language difficulty. The IQ score is 90, on the basis of the most probable birth date. The formboard tests were characterized by relatively good performances at the outset, with slow improvement thereafter. He was notably impulsive and did not correct his mistakes well. His scores, however, were generally up to his age level. The M.A. score in Healy PC-II is about 9 years. He tried many absurd placements and quickly abandoned them, working in a hit-or-miss fashion. It was striking that he would take the same piece and try it in different places.

In the neighborhood where the family lived previously the patient played with boys of his own age and was "always up to mischief," although nothing so serious as now. No abnormal sex interests appear. The economic situation is marginal, the father barely making enough to get along. The patient likes and minds the father better than the mother, who has from time to time wanted to have him separated from the household.

The boy appeared to have normal intelligence, but he showed impulsive reactions in the tests as in life situations. This appears particularly in the performance tests; from the Stanford alone one would not judge him to be a problem.

His vocational ambitions do not extend beyond what his capabilities indicate for him; namely, following his father's occupation. As the patient's difficulties were so largely secondary to home environment, it was desired to place him in a boys' school, with which the mother was at first sympathetic, but later the parents decided to retain him and declined further hospital contact. The coöperation of the priest was obtained, who assumed responsibility for the patient, undertaking to secure institutional supervision if it proved necessary. No further katamnesis.

Case XIX. A girl of 16, third of seven children; of foreign birth, but in this country over 10 years. Regular school progress through grammar grades. It is complained that the father made frequent sexual assaults upon her, threatening to kill her if she told.

Showed normal coöperation in performance tests. In two of the formboard variety she made good average scores, with good learning ability. Her lowest score, at the 10-year level, was in cube imitation. Porteus mazes gave an M.A. score of $12\frac{1}{2}$; both Healy PC tests scored at superior adult level, as did also the Dearborn formboard. She goes at the tests calmly, steadily, and planfully.

The evidence in regard to the assaults conflicted somewhat and was not regarded as sufficient to hold the father legally. At the time of examination patient was under care of a social agency, with the intention of placing out and continuing her education, remaining under agency supervision for an indefinite period. The family has wished her to be separated from them, making many but unverified complaints of her behavior.

To the psychiatric examination she appeared relatively stolid, not showing as much emotional reaction to the episodes as might be expected, though seeming to accept them in part from physical fear. In general she was regarded as a girl able to profit by much better surroundings than she had. The plan formulated for her by the social agency was endorsed. No katamnesis.

Case XX. A woman of 25, only living child; father of questionable intelligence level; mother died at state hospital. Educationally about 3 years retarded, but managed to graduate from junior high school. After mother's death tried to keep house for father, but was not equal to this responsibility. Worked at mercantile and domestic positions unsatisfactorily; claims a better adjustment for the past year, earning \$12 per week steadily. Is an unmarried mother; question of feeble-mindedness. In psychometric examination she was normally coöperative and made rather more than average effort to succeed. She showed a distinctive combination of good and inferior psychometric accomplishments. Problems that she grasps at all she accomplishes well. She gave a meticulously "superior plan" on the ball-and-field test, repeated in the analogous test with a pencil (page 141), which generally shows relatively inferior adaptation. The IQ score figures at 71, which would hardly place her in the adult feeble-minded group. On the other

hand, the content of her responses was often very immature; she failed entirely on the 10-year absurdities. A note at the time says "her mind is unusually literal and fitted for dealing with details, not wholes Totally unable to generalize or think in abstract terms."

In conformity with the above she made a maximal score in Healy PC-I and only a 9-year score in Healy PC-II; further inferior scores were made in Porteus mazes, the Dearborn Form-board, and Manikin. The comparison of the two Healy PC scores is instructive, illustrating a mind performing well at a simple level and seriously breaking down under more complicated tasks.

The patient lived in uncle's family up to 8 years of age. Father has thought she was spoiled by them. On her failing to keep house for her father, he secured other quarters for himself and the patient. Here she was unmanageable, kept irregular hours, and did not do her share of the work. Afterwards the father remarried; the patient arranged to live elsewhere; but the family would not keep her because of her conduct with the alleged father of her child. She has a good deal of knowledge of abortion and kindred topics; points with pride to her resolve to stick by her baby. Alleged father admits paternity, but is without resources. Patient says she will accept a position at housework with the baby, if so advised.

The patient readily takes on the color of her environment, which will therefore need supervision; but her economic history and the absence of positively vicious tendencies speak against providing this environment through an institution. Her present employers were expecting to take her back. No katamnesis.

Case XXI. A man of 28, salesman, oldest of three children, one of whom committed suicide in early adulthood; some nervous and mental disorder in collateral branches. Technical college graduate of average ability. Has worked in various sales positions successfully. It is complained that one night on his way home he exposed himself on the street; a woman passing by had him arrested, and the court referred him to the hospital.

In psychometric examination he was entirely coöperative with normal effort. Performance tests only were made, the results of which are quite superior and consistent with the educational attainments. The Porteus mazes were all solved on the first trial, except XIV on the second (adult mazes not then available). In Healy PC-I all placements were correct; in Healy PC-II a score of

78 was made. In Dearborn Formboard No. 3 he has an unrepresentative mental-age score of 10 years, due to long deliberations. The whole series of problems included but one unnecessary move.

Four years previously the patient had an attack of depression, which cleared up and was followed by an excitement, during which hospital care was necessary but which also cleared up, and patient has worked successfully since that time. Inquiry discloses an overtly normal sex life, with a period of autoerotism and occasional subsequent heterosexual contacts; but there is evidence of more conflict beneath the surface. The patient states that on the occasion of the present complaint he was compelled to urinate, but this appears to have been the second act of its kind within a brief period, the place being the same and within a short distance of his home. Clinically a diagnosis of psychopathic personality seemed justified, but nothing of a psychotic nature was observed and no indication of responsibility limited by deficiency of intelligence. The court was so advised. A fine was imposed.

Case XXII. A girl of 21; mother died when patient was 11; father reported drunkard and shiftless. Of five other children two cannot be traced, and one besides the patient is a state ward. Patient has been a state ward for over 10 years; schooling irregular but reached ninth grade at 17. Has an illegitimate child; question of feeble-mindedness.

A Stanford examination made under conditions of rather anxious effort yielded an IQ of 81, scattering through four year levels; she had had the test before and got the test directions very rapidly. Another organization gave her an IQ of 91, discounted somewhat by familiarity with the test. Subsequent non-language tests were consistent with a normal rating. Healy PC-I had a maximal score, but Healy PC-II an age score of only $9\frac{1}{2}$ years. Porteus and Dearborn No. 3 had 12-year scores. The failures seemed due to impulsiveness and lack of perseverance. Formboard tests showed prompt solution on initial trial and rapid ones thereafter, again modified by some impulsiveness.

The history of the case has been interpreted from two points of view. On the one hand, attention is directed to a continuous failure of social adjustment, slyness, untruthfulness, dirtiness, fainting attacks, from the standpoint of which one would seriously consider segregation. On the other hand, it is claimed that her

early surroundings were such as to give her no proper standards, that she adjusted tolerably in one foster home over a period of years, that her illegitimate pregnancy appears to be her one sex delinquency and under extenuating circumstances. From this point of view one might incline to a policy of further training under more liberal surroundings. From no psychometric standpoint is it possible to "find her feeble-minded" in an intellectual sense, even granted that the schools for feeble-minded offered the best environment for her. Institutional care was actually recommended for her, but it did not appear that she was committable to any institution. Work was found for her in a nursery, where she had some supervision, but she shortly ran away, returning to her own people. There are detailed katamnestic data since this time, which can be only briefly discussed. She has married, given birth to twins, and apparently continued to "float" and not got into any serious trouble. On the other hand, the household has been somewhat of a public charge, and all accounts emphasize the slovenry of the home where the offspring are being reared. The case presents the old issue between dirtiness with freedom and supervised washing behind the ears.

Case XXIII. A woman aged 24; parents and two siblings living and well. Seven years' schooling; reported average work. Housework since then satisfactory by own statement. Is referred by immigration authorities as to fitness for admission.

Although the patient spoke English, it was felt that non-language tests would give a fair estimate. In none of these, however, did she receive a mental age score above 8 years. In the construction puzzle test she worked "nervously," often repeating absurdities and trying to force impossible moves. In the "manikin" test, reversed the arms and legs. Although the Porteus moves were planned, only a score of 7 years was reached. Healy PC-I yielded 62 points (6-7 years). Healy PC-II yielded nothing scorable. The findings are most consistent with feeble-mindedness of an imbecile level.

In a more general observation psychiatrically, all responses are reported inferior or childish. Inferior knowledge of current events and computing ability. Slow in responding. Question of limited endowment or lack of opportunities.

It was regarded as unlikely that she would be able to adjust herself to the more complicated demands of American life. The patient was deported to the country of origin.

Case XXIV. A woman of 21, referred by the immigration service for examination as to fitness for admission to this country. Stanford examination was somewhat abbreviated but disclosed a level not less than 9 years mental age. The designs of year 10 and the ball-and-field tests were especially well done. Language tests were inferior, and the question of language difficulty was raised, though the patient conversed readily in English. At the time of examination the patient was also somewhat tired and hungry.

The Porteus mazes were accomplished at a level similar to the Stanford; Healy Picture Completion Test I was unsuitable to her background and yielded no scorable record. In tests of the construction puzzle type (psychomotor learning) she did inferior work, scoring mostly around the 6-year level, but this was attributed rather to embarrassment and anxiety than to fundamental incapacity. In psychiatric examination she was described as pleasant, neat appearing, shy, talk normal, and prompt. She told a brief but coherent story; left school at about 14, has worked on the farm of relatives, well treated, little opportunity for recreation. Knows nothing of politics of home country. Reads fairly well. Knows ordinary time relations but has not learned to read clock — claims never had one about.

While distinctly below average, there was felt to be a chance that she could get along in this country in a sheltered environment. Being still young and with few opportunities, some further development was possible. The patient was admitted to this country; present whereabouts unknown.

Case XXV. A boy aged 11, oldest of seven children, only one other of whom has presented any problem. Mother sickly, progressively worse after each child. Husband at times drinks to excess; not indolent, but employment of a seasonal nature. Children as well treated as circumstances permit. Patient now in the fourth grade, about up to age, but repeated at least once. Brought with rather vague complaints of "nervousness," "backwardness," and motor symptoms suggesting chorea.

Fair coöperation was had in the Stanford scale after some initial timidity. There was noted a special difficulty in expressing himself in language, but this difficulty is only partially reflected in the test scores. Consistently he failed in the rhymes of year 9 and passed a relatively non-linguistic test in year 16 (enclosed boxes). On the other hand, his next highest successes were the picture inter-

pretation and similarities three things, which both make special demands on language. The record is seen to scatter through six year levels. The score yields an IQ of 94, nearly average, but is otherwise an erratic performance. The Stanford score was perhaps sufficient for the practical demands of the problem, but from a psychometric standpoint a thorough non-language survey would have been indicated.

Under psychiatric examination he is described as responsive, coöperative, rather docile, relatively timid. Tells of anxiety dreams, of murders, and the like. Considerable enuresis. Reacts violently to teasing by siblings or other playmates.

Since hospital findings the patient has ceased to be a problem. Enuresis has ceased, also quarreling with other children. Has in capacity of oldest child assumed charge of the household while mother was away at work. Reacted well to a week in a summer camp. The family situation is complicated by economic factors, but the patient's mental hygiene problem appears to have been adjusted.

Case XXVI. A girl of 18, referred as an unmarried mother; question of feeble-mindedness. She is the third of five living children, all of whom present conduct problems. Heredity inferior.

During the Stanford examination was indifferent, yawning, staring into space, shrugging shoulders in response to urging. She showed more interest in the more difficult tests. The IQ was 68, but this clearly did not have the usual relation to the general adaptive capacity. The scatter was over seven year levels, 7 to 16.

The performance tests were preceded by a brief lecture on her previous inferior performance. To the cube imitation, triangle, and diagonal tests she responded much better, attacking them with more energy, making good initial scores and carrying over learning to later trials. The level was at least normal average. She also had a maximal score in Healy Picture Completion Test I and one of $13\frac{1}{2}$ in the Porteus mazes. Here she was quick to grasp idea, and was interested, cautious, slow-going, looking ahead.

This case thus evinces a marked negative adaptation to the Stanford scale with a more favorable attitude toward non-language tests. The examiner's comments no doubt played a rôle here, but it is to be noted that she made more effort in the harder tests of the Stanford, and the non-language tests are in general less "insulting"

to adult intelligence than the former. On the basis of the findings the patient may be regarded as of normal intelligence.

As a child, the patient did not adjust well to school ; left after making the sixth grade at 14 ; much truancy. Did well in a home as a mother's helper, reported as dependable and teachable. Was later employed in two industrial establishments, both of which report that she worked steadily and learned quickly, with good earning capacity for her age.

Home background has been poor, straitened economically ; father dead ; mother negligent. For a year and a half prior to examination patient had kept company with the father of the child ; when two months pregnant quarreled with him and has not seen him since. Does not wish marriage because of his alcoholic habits. Ready to take position at housework with baby, now a few weeks old.

The psychometric findings would be consistent with an instability of adolescence, as would her sex delinquency, but this is not so consistent with her emotional falling off, the feeble reaction she shows to the situation in which she finds herself, and the apathetic attitude toward the life problems that confront her. Careful supervision is demanded and a specially selected foster home or institution. She would probably react well to the latter but might not be legally committable to such a charge.

A foster home was found for her where she adjusted well ; she was, however, persuaded to leave by an elderly female relative who said she could support both. This same relative persuaded the patient to give baby ordinary milk instead of the regular feeding formula, not to cut the baby's nails or it would die ; was reported very unsanitary personally. Sight lost of patient since this time.

Case XXVII. A boy of 10, second of five children ; psychotic heredity on the maternal side. In the fifth grade of school. Presents no particular problem personally, but there is a difficult family situation, one of the features of which is a violent dislike of him by one of the older siblings who continually quarrels with him and is brought for examination at the same time.

In Stanford examination the patient coöperated quite well and showed a rather sophisticated outlook. The IQ score is 136, normally regular. The fables and enclosed boxes were passed at 16-year level. In the non-language tests he was less good, though still testing above age ; the formboard tests showed the most difficulty, with rather slow learning. Healy A took him over five

minutes on the first trial and forty seconds on the second and third. His inferior reaction to the performance tests was associated with a lessened manifestation of interest. There is apparently a preference for manipulating ideational rather than concrete material.

There is a complicated family history, culminating in a broken home; children now being cared for by father, at a good level. The sister, with whom the difficulty arises, is also superior (IQ 124). The immediate problem concerned this latter patient. This required some months' management, but her attitude in general and toward her brother in particular was satisfactorily adjusted. The psychometric findings in this case might have suggested trying to balance the ideational and concrete capacities more evenly, but the value of this can also be questioned. Katamnesis shows a very satisfactory situation, personal and domestic. He is not developing one-sidedly, but has well-rounded and active cultural, recreational, and social interests for a boy of his age.

Case XXVIII. A boy of 14, third of six children, one of whom is a behavior problem of somewhat similar character. Neuropsychotic heredity on both sides. In school is said to have "repeated almost every grade," which is not consistent with his having started at 6 and reached seventh grade. No disciplinary problem in school, but at home various neurotic traits, nail-biting, masturbation to excess, and homosexual practices with younger brother.

In Stanford examination coöperated well, and the regular record with an IQ score of 74 may be considered evidence of slight deficiency in its sphere. The best work was in memory for digits; he corrected some errors spontaneously, but in general the judgment tests were poor, and he made wrong answers rather than remain silent. The performance tests were notably superior, in the presence of similar coöperative effort. The picture completion tests he did at age or better; the Porteus mazes he approached with enjoyment, studying each carefully before beginning and getting all on first trial, except for two trials on XII. Dearborn formboard was slow, but with only three superfluous moves for the series. The other formboard tests were of a higher level, all adult scores, with prompt learning. There was some manual fumbling, due to haste. He said spontaneously that he could "do things with his hands all right."

The play life is normal; he gets on well with boys of his own age. Well behaved at home when his brother is not around. In psychiatric examination he is untruthful and gives varied accounts

of his recent activities. From a psychometric standpoint there was no reason why he should not become a self-supporting and useful member of society; but it may well be that further academic schooling is not advisable and that education should be along vocational lines strictly. Separation from the brother should be considered, also placing out in an environment where there is considerable scope for physical activity. No katamnesis.

Case XXIX. A boy of 10, third of seven children; no conduct disorders in family history. Has not adjusted well to school discipline; has been in special class but can do well if he tries; truancy. He is chiefly complained of as a chronic runaway. He is frequently picked up by the police at all hours of the night. His clothing being taken away to prevent this, he escaped in a bathing suit and returned in some one else's clothes. Always supplied with money, obtained no one knows how.

Did not adjust well to Stanford examination; was pleasant and willing enough, but bored; had been tested thus before; more interested in looking out of window. The IQ score is 74. The two successes above 8 years were making change and absurdities; in the latter he had no errors. In the Porteus and Healy PC-I his response was distinctly better; Porteus scored $9\frac{1}{2}$ years and PC-I a score of 357 points, or over 10 years. In the former his record notes "caution and persistence"; in the latter, "critical discrimination." The formboard tests elicited less favorable reaction, which was thought to be owing to fatigue at the long examination. The first of them, the Seguin, tested up to age, but three others were inferior.

Whatever the psychometric ratings, the case is hardly intelligible as a failure to manage one's affairs "with ordinary prudence." The home has been precarious, owing to the father's ill health and the mother's having to work, which has left the younger children practically without supervision. Ordinary recreational facilities are absent. To this an energetic and excitement-loving nature, impervious to ordinary discipline, reacts as above and with petty street mischief of all kinds. With strangers he is quite friendly; makes a care-free and happy impression.

The vicious tendencies of this boy are very much a function of environment, but he was regarded as likely to be a considerable problem in any environment available. He would hardly react well to the quietness of rural life, and city surroundings turn his energies

into delinquent channels. If he could be tided over until relative maturity, he might turn out a quite successful type. An institution was recommended, psychologically rather on grounds of social expediency than as the best imaginable solution for the boy himself. This was afterward carried out. At the end of $2\frac{1}{2}$ years he was stated to be doing good school work, with fair general conduct; "rather irresponsible." He might earn parole in three months. The economic situation of the home is somewhat improved.

CLINICAL MATERIAL ON GENERAL REACTIONS IN PERFORMANCE AND OTHER TESTS

[In the following cases there are cited more detailed accounts of the patients' reactions to the tests given than are relevant to the quantitative aspect of psychometric work. Attention is here particularly invited to the patient's criticism of his own responses, both spontaneous and under suggestion, the reaction to mistakes seen only after making and to self-evident failure in accomplishing a too difficult task (as a puzzle box).

Observations are cited for such tests as picture completion, Kuhlmann unfamiliar and inverted forms, Stanford vocabulary, etc., including a puzzle not standardized and here known as the "shot" test. It is a shallow, covered aluminum tray about $1\frac{5}{8}$ inches square, containing four shot; one must be got into each corner. There is a trick solution which practically no one finds.

These observations will be quoted in substantially the form in which they were recorded. This involves repetition of some explanations, without which the procedures would not have been adequately understood in the histories and which may not be superfluous in the present connections.]

Case XXX. A man of 40, without anamnesis of any reliability. According to his own statement, reached third grade in school at 13. Has worked at various unskilled occupations; also done some professional boxing. Was arrested as a vagrant and referred to the Hospital on account of extravagant statements to the court.

Very coöperative in Stanford examination, with a good deal of shallow interest; verbose answers. The IQ was 67, scattering through four year levels, induction being passed in year 14.

"In Healy PC-II he is described as coöperative in an easy-going, readily distracted way; wholly willing, but incapable of much effort. The psychometric score was between the 7- and 8-year levels, includ-

ing one abnormal placement — the dog for the red book. He made none of the best placements. When the instructions were given, he hesitated between the high and low shoe; finally discarded both and offered the slipper. He put the 3-pane window where the 6-pane one belongs. Being asked about the 6-pane one, he accepted it, giving as reason that the red house shown in it corresponded with the red of the boy's book. In response to such suggestions he was often able to improve the placements he first made, but he was never able to grasp any more than the crudest and most obvious connections. He was easily switched from the task in hand by his own answers to the questions, rambling on irrelevant matters. The test reaction is in harmony with the other findings, in pointing toward institutional supervision for this case."

There was in the picture a shallow euphoria and expansiveness suggestive of general paresis, in spite of the absence of physical signs. He was transferred to another state hospital after eight days of observation, with a diagnosis of psychosis with mental deficiency. There he is since reported as indifferent and seclusive, with many loosely woven expansive ideas and evidences of auditory hallucinations. His mental condition is stable, and physically he is quite healthy. Nothing neurological is observed beyond pupils sluggish to light. Dementia Simplex is the present diagnostic view, strikingly in accord with what would have been suggested in the above-described reaction to Healy picture completion.

Case XXXI. A woman of 56; anamnesis not over-reliable, but apparently of healthy stock. Probably backward in school, but did well in dressmaking until marriage. Marriage satisfactory, but husband died some ten years afterward. Is referred by the court on charge of keeping unlicensed lodging house.

In Stanford tests coöperation was active, but patient was over-talkative and over-emotional. Some tests had to be omitted because of visual difficulty, her glasses not being available; the IQ score was 79, low normal for adults. The result of an examination directed at memory functions (see Chapter VIII) was quite variable but far below normal limits in "old personal" information and "hard town-state"; and other features well above average.

"In further examination there was no systematic determination of a mental level, but the patient's reactions to certain standard tests were observed with reference to the following points:

a. *How does the patient react to tests far below the intelligence level?*

In such tests the patient preserved a critical attitude, with no special affective reaction. She was given two 3-year and two 4-year tests from the Kuhlmann, in one of which, dealing with memory of geometrical forms, she made an error. Her attitude seemed unaffected by the inappropriateness of the tests to her mental level.

b. *In too difficult tests does she give inferior solutions without criticism?*

In defining relatively difficult words she uniformly defined either promptly and satisfactorily or said 'I don't know.' There were no false definitions. The enclosed boxes problems she reasoned positively and correctly in three cases; in the second problem there was an error in her understanding of the tests that made her answer wrong; she did not appreciate it. Sentences too long for her to repeat from memory she gave according to sense, but said on inquiry, 'Not quite all right.' Her attitude toward these tasks therefore showed fairly good criticism. Terman's ingenuity test she approached in a very inferior manner, persistently contrary to directions, but never reached a solution that satisfied her. 'I can't tell you what I was never taught.' In spelling backwards the word 'decision,' she counted the number of letters on her fingers to be sure she would get them all. She would get stuck on the fifth letter; tried repeatedly, finally got it wrong, but consistent with her forward spelling. She seemed little subject to illusions as to the correctness of her answers. She remarked, however, that under ordinary circumstances she would have something better to do; an idea not occurring to her in response to the very easy tests.

c. *How does she react under counter-suggestion about her solutions?*

The Healy PC-II was utilized. She accomplished the standard test in about four minutes, thinking aloud the while, expressing many weak rationalizations of her placements and making them out of their logical order. There were only two placements gaining positive credit and two absurd placements, the final score being almost zero; a record that by itself would suggest malingering or schizophrenia. Thereupon she was shown other pieces, sometimes better and sometimes worse than those she had put in, and asked to compare them. In detailing these responses, the picture she put in would be named first and then the picture or pictures she was asked to compare with it.

CLOCK 8 : 30 (cap) (Clock 8 : 30 ?) She accepts it at once with the words 'Precisely — Charles, you're late !'

RED BOOK (blank) (blue book?) 'Why he has his books — Ah, I see, he is carrying his books' . . . accepts it.

CAP 35. (Clock 4:30, changes to blank) (Statue?) 'Statue on the pedestal — I agree with you, doctor.'

WINDOW 23. (Flowers in vase) (Mail-wagon?) 'I cannot see that the automobile belongs in the house.' Does not accept it.

INK. (Lunch box) (Falling tree?) With a little hesitation accepts it.

KITE. (Kite) (Window-shade?) 'They are looking up at the kite.' (Mail-wagon?) 'No, no, that is an automobile on the street and they are looking up high.' (Spectacles?) 'No, they would be more interested in something they made, like the kite.' (Balloon?) Accepts balloon. 'They are looking higher than the kite would go.'

AMBULANCE. (Airplane) (Picture on wall?) Rejects it. (Ambulance?) 'The officer is pointing high up and the automobile is on the street.'

BOY 3. (Blank, then clock 4:30) (Boy in knee pants?) Accepts it. 'He is one of the boys going home too. Of course at 4:30 school is out; at 3:30 or 4:30.'

AMERICAN FLAG. (Birds) 'They have opera glasses looking at the birds.' (American flag?) Hesitates. Fumbles mentally with a good deal of weak reasoning, but accepts change.

SCISSORS. (Red book) (Scissors?) 'Ah, cut out pictures, papers, and so on. That is very good. He will probably cut out pictures though that is for little girls more than boys. She might be sending him for the scissors, and that is just what it is . . . to go get her the scissors . . . she is pointing to them.'

The weak reasoning in this test contrasts markedly with her other performances. It should be remarked that she had her glasses, and the comments she makes above cited indicate that the objects were well distinguished.

d. *What is the reaction to tests which, obviously to herself, she cannot solve?*

Her reaction to such tests was studied by means of the harder Stenquist tests. In these, however, she did much better than would have been expected, remarking that as a widow she had had to do many things about the house and had learned such things. In most cases it was not a test of persistence in the face of a long unaccomplished task.

She attacked the clothespin in a desultory fashion, thinking aloud.

After 2 minutes 30 seconds she said, 'I give it up,' but kept on trying. Deprecates the task, as above — 'I had no time for fooling — left a widow' — but keeps on trying, with some affect showing in flashes of hope of getting it done. After 5 minutes says that she has something that will work partly; later says of it, 'No, I think that is all right.' (It is.)

Spontaneously picks up the paper clip, discards it for the links. Does them all in 1 minute 20 seconds. Comments on practice in fixing bathroom chains. Goes spontaneously at bottle stopper; gives up after 40 seconds. Tries latch; gives up after 50 seconds. Her talking diminishes; she tries the shutoff and does it in 50 seconds; also the push button in 1 minute. Works persistently at the bicycle bell, with only occasional exclamation. Occasionally says 'I give it up,' but always keeps on trying. Works at it for over 10 minutes and gets a result that will ring after a fashion, but not correct.

In sum, the patient is fairly good on formal mental processes and critical of her performance there. She shows no special reaction to tests that would normally 'insult the intelligence' of a person in these ways as capable as she. Her mechanical intelligence is also good, and she shows no lack of persistence in working at difficult tasks. Her judgment in all but the simplest practical situations is so weak as to seriously raise questions of deterioration in this sphere. Her general bearing was one of weak effusiveness, and there was a good deal of affected phraseology in her talk."

The history is rather involved for summary, and is questionable as to fact at many points. It was felt that intellectual deterioration and mood instability were present, probably on the basis of cerebral arteriosclerosis, though not sufficiently so as to justify a legal classification of insanity. Some form of institutional care did appear advisable; the patient was actually placed on probation by the court, during the period of which she proved amenable to supervision and gave no further trouble.

Case XXXII. A girl of 25, with an up-bringing well intentioned but with frequent changes of surroundings, showing anti-social tendencies from school days on. Graduated from grades at 15. Unsteady employment, but is not incapable of satisfactory industrial work. Is referred on account of sex delinquencies, whose history is particularly lurid.

Stanford examination yielded normal coöperation and average

adult score within two points of that made on a visit 5 years previously. There is no question of defective intelligence in the ordinary sense.

Further examination was not directed at the establishment of age levels, but at observing the general reaction to standardized experimental situations.

She was given tests from the Kuhlmann series in which errors would be likely, to test her criticism of them. In the hard directions test she read aloud and slowly, checked herself in error at times, but also made mistakes she was not able to see. The performance itself was extremely rapid, so that the four errors made still leave the score at above average adult.

Tried with the inverted forms, she would draw the lines crudely and hastily, then mull over them, with numerous erasures. Details of the five items are as follows:

(1) 185'', 3E. Fairly steady effort with numerous erasures. Picks out errors promptly, laughs at them a little.

(2) 92'', 1E. Effort as above, does not signify when through. Corrects own mistakes promptly, frankly, and smiling; less concerned about them than would be expected in a normal subject.

(3) 95'', 2E. Laughs rather more, "I got only 50 on that."

(4) 85'', 1E. "Oh, I got it all right, didn't I? No, I didn't get this big line right," all spontaneously and with slight laughter.

(5) 193'', OK. "The first time I got it right." Correctness observed very promptly. The general psychometric score is average adult level.

She was tried with the unfamiliar forms, to test further her reaction to mistakes and her general reaction tendencies to difficult tasks. These were in detail as follows:

(1) 6'', 2E. Drawing extremely crude. Smiles at errors, *which she sees promptly*.

(2) 7'', 1E. Laughs a little, "I got that one wrong."

(3) 8'', 1E. No special reaction to error. "I thought that one should go there instead of there" (pointing).

(4) 6'', OK. Drawing unusually crude, but very quickly done. Points to a line which she says should be a little more slanting, correctly, but her drawing is near enough to pass.

(5) 6'', 1E. "Oh, yes," smiling, "I should have made that go over there." Prompt recognition of errors especially noticeable.

(6) 7'', OK. "I think that looks like it a little." OK in principle, but crude in drawing. Little animation in her comment.

(7) 8'', OK. "That is all right," giggling. Here and elsewhere, she habitually does over the lines once drawn as though to improve them, but really makes them look worse.

(8) 9'', 1E. "That should have gone up this way." Prompt recognition.

(9) 8'', OK. Checks up quickly. "That is all right."

(10) 7'', OK. "That is all right; that makes the whole of them."

The psychometric score is a rather better than average adult performance, in the judgment of the writer.

To observe further her criticism of her reactions, she was requested to do Healy PC-II in the usual manner, and then was asked to discuss various alternative placements. She completed the placements in barely three minutes, and when asked to go over it and make any corrections desired, gave it only the most perfunctory survey. The psychometric score is average for the 9-year level, and far below the 25 percentile for average adults. There was one absurd placement. More in detail:

CLOCK. (Clock 8:30) (Clock 4:30?) Declined, properly rationalized.

RED BOOK. (Dog) (Pencil box?) "Yes, it looks as if his books were coming apart, doesn't it? I think the pencil-box would be better." (Lunch box?) "No, he would have it by the handle, he would not be carrying it with his books." (Red book?) "I think that would be fine, because he has three books, and there is a red book there when he gets home" (pointing to the picture of the schoolroom).

CAP 35. (Footprint, then, rationalizing, blank) (Baseball?) "He is saying hello to his comrades, they are not playing ball." (OK cap) "He might have thrown up his hat into the air . . . Yes . . . that would go fine there."

WINDOW 23. (Four-paned window) (Blank?) "No, because there might be a window in the door . . . (shown it is wall) . . . No, but the shadow is not right." (Window with shade?) "No, it is a different kind of window." Picks out window with three panes. "That would be the best one of the three." (Six panes?) At once sees it is correct "because it has a bar across."

SCISSORS. (Cat) (Shoe?) "She is referring to something; she would not be talking about the shoe. The cat amuses her." (Spectacles?) "I think I would rather have the cat in there; she might have told him to pick up the glasses." (Ball of yarn?) "She is embroidering with something black and that is red." (Scissors?)

"She might have told him to pick up the scissors, but she has a table she could put the scissors on. I think I would rather have the cat."

The above picture is dominated by (1) hasty, crude, ill-adapted reactions, (2) much better reactions when further consideration is forced than is spontaneously given, and (3) very superficial affects. So far as experimental reactions may be read into the general personality of the patient, one would expect this individual to do badly by herself, though she is able to respond well to supervision.

The picture is that of a girl probably ill endowed at the start, with little stabilizing influence in her home or educational life, who in later adolescence develops many delinquent traits in the sphere of larceny and sex promiscuity. One psychotic episode prior to present admission, when she seemed at first elated, then depressed. In hospital she was relatively quiet and orderly, made normal appearance so far as psychosis is concerned but evincing very low ethical standards, and unusually little reserve in talk on sex matters. She was discharged to court as "not insane" psychopathic personality. Subsequently she was committed to a reformatory, where her behavior was more violent, suggesting a return of psychotic excitement. She later escaped from this institution. It is possible that mood swings play greater part in this girl's reactions than the records bring out and that her most antisocial acts have occurred in hypomanic periods.

Case XXXIII. A man of 20; occupation given as clerk; no outside anamnesis. According to own statements, finished grammar grades at normal age, but apparently never knew who were his parents and had no home training. Subsequent occupations were such as to expose him to many temptations; is referred by court on charge of larceny and passing worthless checks.

In Stanford examination the patient showed coöperation and interest, though wandering attention. The IQ score was 79, low normal adult, fairly regular. Fable at XVI was highest pass.

The further examination was not directed at the establishment of age levels but at observing the general reaction to standardized experimental situations.

He was first tried with tasks on which he might deceive himself as to the quality of his performance. With memory for digits he was uncritical of errors (which he made even on five digits) until called to his attention, when he would become over-critical. Much

distorted repetitions would, however, be given without hesitation. Six was the maximum number he got correctly.

With the Kuhlmann unfamiliar forms his performance was quite abnormal. One feature of this was the continual patter of remarks he kept up. He was so erratic about the order in which he took the circles that it became necessary to indicate the next one each time. The outlines of his drawings are unusually sloppy, though he often goes over them more than once. His is the only record so far observed in which there are cases of more than the actual number of lines being drawn. Some of his outlines are fantastic in their lack of resemblance to the original. At other times he would do very well, and he always worked especially fast, so that the age-level score is at 12 years, consistent with his Stanford record, and that of Healy PC-II described below.

In Healy PC-II he continued his tendency to think aloud; worked fast, giving the test only the most cursory review. Regularly he put in the first thing he saw which made any sense at all and spent no time on the finer points. For Cap 35 he put in the brown cap, progressing with some suggestion to the correct one. Window 23 he omitted altogether at first, and returning to it put in a blank. Then, "One could put a window or a looking-glass there, but there is nothing to show there is a glass there." The Ink in V is well rationalized, "Of course she would be holding her skirts for the mouse, but this kid would not have such an expression on his face; he would probably be smiling." The Kite is correctly analyzed, as is the Ambulance. His comment on 8, the baseball players, is: "This is another fellow here who has been playing." (He puts in (33).) ("What about (17)?") "No, you see he has his hand in his pocket and the reflection shows it would be the same as this one." ("What about (3)?") "No, no; still, that would fit in . . . still his expression here . . . I think that is the right one. . . . No, it is this one (3) . . . this (33) is catching on account of the 'T' on the sweater — I thought they belonged to the same school." Again, for the scissors, he put in the cat, for his sixth placement in the entire picture. Shown the spool, "No, because of the expression on the woman's face. . . . She is saying to the boy, 'Isn't it a cunning kitten.'"

The history as obtained from the patient is characterized by alcoholic indulgences, extravagant purchases, bad checks, impersonations of highly placed individuals; some details of the last are corroborated and would not be out of place in the Arabian Nights.

He appears to be predominantly homosexual and has had one period of other mental hospital residence. Here he adjusted well to the surroundings, helped on ward work, mixed agreeably with the other patients, and was in good contact. His attitude toward his own conduct was variable. The patient was discharged to court as psychopathic personality, not insane. It was felt that the outlook was for further delinquencies in the absence of a supervised environment. He was sentenced to a term of confinement, from which he appealed and was given a heavier sentence.

Case XXXIV. A boy aged 18, fourth of eight children; no other psychopathic features in family; all information from patient. Marginal economic status; school progress apparently normal and has fair earning record. Is referred by court on complaint of homosexual practices.

Stanford examination yielded an IQ score of 68; quite regular, but seeming inconsistent with the school record.

Further examination was not directed at the establishment of age levels, but to observe the patient's general reaction to standardized experimental situations. He was tried with Healy Picture Completion Test II, in which his psychometric score was average adult. He grasped the directions quickly and showed fair initiative. However, the pictures were done outside their proper order. He does not speak spontaneously, works deliberately, and to all appearance is making careful choices. At 14 minutes 30 seconds he had finished, and finished his reexamination in 18 minutes.

INK. Puts in the red book, then the ink spot. Takes out the ink spot and puts in the milk bottle. Shown the ink spot, "There is ink on the desk and he would not have two bottles." Shown the pencil box, "He had his pencil box on the desk and knocked it off when he got up and upset the pencil box." Shown the mouse, "I think that would go better because the teacher is frightened."

BOY 3. Puts in boy No. 33. Shown boy 17, "No, because he has got long pants on." Shown boy No. 3, "No, his kite is flying." Persistently refuses to accept No. 3. "It does not look as if the shadow would be so tall." "Perhaps that might be the right one, but it does not look to me so."

In memory for digits, he gave five and six correctly and without much difficulty, making good effort, whispering to himself as they were read. Above these figures he got none correct, showing hesitation and sometimes saying, "I lost that one." He never gave a

correct series on which there was hesitation. In the hard vocabulary words he showed no tendency to "bluff through" responses above their face value. If he was not sure, his hesitation was obvious. His answers were not of an especially high level.

To observe his reaction to obvious thwarting of response he was tried with the Kuhlmann inverted forms and with the shot test. He seemed rather overawed by the task of the inverted forms. He did not study the trial card efficiently; kept it most of the time turned on its side. Given the first trial, he made no attempt at drawing during the five minutes it was left in front of him. It was simply looked at, and he made a pretense of studying the figure, saying nothing the entire time.

For the first 25'' with the shot test he tilted the box gently back and forth.

25''. Shakes it more violently, holding it in the air away from the table.

45''. Resumes gentle tilting movements.

2'. Laughs feebly; says, "I don't understand it"; continues slight tilting movements.

2' 25''. Tries shaking it again.

3'. Shakes his head; "I can't do that"; puts it down and folds arms.

3' 15''. Takes it up again with shaking movements.

4' 05''. "I've got three of them," and then seems discouraged when they fall out in his attempt to put in the fourth.

4' 20''. Puts it down.

4' 25''. Picks it up again and shakes it violently.

5' 40''. Gives it up; "I can't do that." Puts his hands in his lap, sighs, makes no further attempt for the next minute.

He was also tried with Kuhlmann's unfamiliar forms test. To this his reaction was inadequate, though not more markedly so than to the more difficult inverted forms. He took long and made many errors, the performance being unscorably low — far below the lowest norm for the test, which is at 11 years. He made some spontaneous comment on practically every problem, and was able to pick out his errors fairly quickly but not to guard against making them. There were many comments — "I can't do that"; "That's wrong, too" — and he seemed to take his failures somewhat as a matter of course. He improved a great deal with practice, but he got only one figure entirely correct, and then perhaps by chance, as he was very long about it.

Summarizing, indecision and vacillation are shown in the many placements he makes to Healy Picture Completion Test II. To some extent he betters inferior placements that he makes in the beginning and betters them considerably more upon suggestion. Many of his original placements are very weak, though his final score is normal adult. The critical faculty which he has does not work spontaneously. His reaction to errors that he sees is not normally intense, and he seems to take them as though expected. The difficulty of tasks deters him from making normal effort, as his entire quiescence before the inverted forms test and the relatively weak reaction and easy giving up in the shot test. Altogether, an inferior make-up is indicated, whose adequacy for independent getting along is doubtful apart from the specific instinctive difficulties.

There is record of many sexually inverted reactions on the patient's part. When a boy, dressed in girl's clothes. Has stolen mother's cosmetics. Feminine gait and manner of speech; rolls his eyes. Feminine pubic hair distribution.

Religious trends are also present, in connection with some hallucinosis. God talks to him in a sweet, low tone, giving him encouragement when he is worried or depressed and to go ahead when he is doing something good, as reading the Bible. The Devil talks to him in a rough, harsh voice, tempting him to homosexual practices. Psychosis with mental deficiency was diagnosed and the patient committed to another state hospital. After some months' residence there, he was returned to his home state.

Case XXXV. A woman of 27, fourth of seven children; nothing of a psychopathic nature observed elsewhere in family. Apparently normal school history; has worked in clerical positions; since adolescence has suffered from excitements and depressions. The present observations were made after the subsidence of an excitement and the supervention of a slight depression, which later cleared up sufficiently for the patient to leave the hospital. About a year later she was again admitted in a mildly depressed condition, which is at this writing again clearing up.

The patient's psychometric score by the Kuhlmann scale was average adult intelligence, but the record was scattering and irregular. The tests on which she lost most were those where close study with some degree of memory were involved; on tasks to be done at once or not at all she did very well. She showed less than the usual tendency to hurry on time tests where this was called for.

Further study was made of her reaction in regard to special topics; for example, as follows: How does she react to tasks where she fails and her failure is evident to her? In approaching this type of task she showed much less than the usual energy output, making comparatively feeble efforts and quickly relinquishing them. Or again, in difficult tasks where she might "bluff it through," does she attempt this? Such a tendency was not found; thus in long digit series the intonation of her voice was questioning when she made a mistake, or she readily said she did not remember. In difficult definitions the tone was again questioning or she said she did not know.

Left to herself in Healy PC-II, she made an inferior adult score, 50 points, on the basis of her first moves; upon the revision to which she was entitled changes were made, altering the score to $61\frac{1}{2}$ points. Upon the suggestion of comparative, sometimes better, sometimes worse, moves this score became nearly perfect, $94\frac{1}{2}$ points, though in one instance she accepted a move inferior to what she had made herself. Some of these gains also were half spontaneous; that is, the examiner would be calling her attention to some piece other than the better one, when she would see it and put it in.

In the presence of normal intelligence the patient shows a very limited capacity when left to her own efforts. Her moderate energy output accounts for much of this — directly in the case of giving up before difficult tasks, less directly in the slight criticism evident in Healy PC-II. The good score in the general intelligence test and the marked improvement in Healy PC-II under supervision suggest that under moderate pressure she is able to utilize distinctly more adaptive capacity than she does spontaneously.

Psychiatrically the case is a fairly typical circular psychosis, with the usual outlook and program of management for such cases. The psychometric account is obviously uncolored by a knowledge on the examiner's part of the psychotic history. From one point of view the figures are not those of the classical *Denkhemmung*. We should rather expect to see the patient fail in tests whose effort came all at once and to do better under the stimulation of continued tasks (cf. the Kuhlmann). There is not the overcoming of the *Hemmung* from within that has been reported at psychometric levels by many workers from August Hoch on. On the other hand, when the stimulus is applied from without, as here in Healy PC-II, improvement in performance is very marked.

Case XXXVI. A man of 32, from apparently good stock; all information from patient. High school education; no abnormal

personality traits; athletic and mechanical interests; a quiet type; various occupations of the skilled-labor level. There has been maladjustment to the wife, the responsibility of which it is difficult to fix, but it culminates in his being sent here for observation on the ground of threats and what looks like a weak suicidal attempt.

Although coöperation seemed normal, the Stanford examination was not consistent with his educational history, yielding an IQ of 72, without special scatter.

Further examination was not directed at establishing an age level, but to observe the patient's general reaction to standardized experimental situations. In response to Healy PC-II, his first move was to put in the low shoe without question. Then,

CLOCK 8:30. Puts in clock 4:30 and takes it out, putting in 8:30. Does not seem to perceive the order of pictures, although this has been explained to him; does not preserve any idea of the test at all. It is explained to him again. "Oh, I see now."

RED BOOK. Puts in lunch box, talking to self, thinking aloud a good part of the time. Hesitates a little on lunch box, but leaves it in. Later he tries the footprint here, but rejects it. Finally puts in a blank.

CAP 35. Puts in the correct cap. Later in the test takes it out and replaces it with the lunch box from the former place.

WINDOW 23. Omits it and goes back to it after making the fifth placement. "I can't get that at all" (laughing), but puts in correct window. Shown Picture 11, "I imagine you can use it too. Both are windows; sure, there is the schoolhouse too." Accepts 11. Spontaneously replaces it with the mirror. "You can use this and have a blackboard. That's all right."

INK. Puts in milk bottle. Afterwards, "Oh, that's what I was looking for, the ink. He has spilled the ink." Shown the mouse, "Still it looks as if he had dropped something, and she holds her dress like something had spattered like ink." At this point he fumbled with the experiment rather aimlessly about two minutes. "I don't quite get this yet, doctor."

KITE. "And here it seems that these boys are waiting for him to come out and play." Finally he puts in the window shade here.

AMBULANCE. "And here there seems to be some excitement; they have got a cop there." Puts in ambulance; afterward finishing the test with little hesitation or comment.

BOY 3. Puts in correct boy. Shown 33. "Well, this boy has got on blue pants — no, that shows his shadow." Shown 17. "No, this one has on long pants." Maintains the correct move.

AMERICAN FLAG. American flag.

SCISSORS. The blue book. Shown the ball of yarn. "Yes, she is telling him to pack up the thread. She is sewing." Then shown the scissors. "I believe that is still better. She is at the end of her thread and she wants to cut it. I presume that would be better."

This test reaction shows marked variation in ability. He makes several absurd moves with quite weak rationalizations, and at other times shows an entirely correct comprehension of even rather fine points in the test. His general behavior showed mild amusement at the task, but he appeared to be making good effort. The psychometric score falls within the lowest 25 per cent of the adult group.

In memory for digits he responded in a quite orderly manner with assurance through seven figures. He recognized a mistake made in one series of eight figures. One of nine figures he got correct and on another he broke down. He thought he had made one mistake in each. When asked the definition of five relatively difficult words, he acknowledged ignorance freely and gave no wrong response. The definitions he gave were rather good. Tried with Binet's paper-cutting test, he said, "There will be two sheets of paper — just one crease in each." He drew a single sheet with one line across it for a crease. (What about the whole sheet?) "The hole will be like this," and he drew a single hole at the center of the page. Here he seemed quite unconscious of any error. In the induction test he grasped the rule by the fourth folding, with insight into his failure on the former test. In these observations there is again noticeable the irregularity of performance level, sometimes with good insight into failures and sometimes with none whatever.

The patient was further tried with tests calculated to bring out his reaction to seeing mistakes, and thwarting him. The Kuhlmann unfamiliar forms test he accomplished with a score below the lowest norm, 11 years. With the first figure he did nothing, being weakly apologetic for the failure. He made some comment upon almost every one of the figures, his general attitude being to laugh in a very easy-going way over his performances. He spontaneously looked for errors and picked them up quickly, drawing in the correct lines occasionally. The lines were lightly and rather crudely drawn. Two diagrams he made correctly; in the third he made one error, and in the fourth, two errors. Tried with the inverted forms, his score was again below normal. All the lines were wrong in two cases. There was one case of three errors, two of one error each, and in one case all were correct. He worked at the problems with

unremitting but never very intense effort. He seemed surprised at the one he got correctly; apparently he had twisted himself in his chair somewhat so as to get a not quite inverted picture. The first picture and the last picture he drew exactly as they were without inverting them and without seeming to appreciate his error at all until called to his attention.

He was then tried with the shot puzzle. On this he worked almost without remission for fifteen minutes, a much longer period than usual, his demeanor being in general as described for the other tests. The detail of his behavior was as follows :

20". He begins work without system.

30". Shakes it.

35". Turns it upside down.

60". Stops a moment and begins again.

1' 30". Shakes it violently.

4'. Turns it on edge.

4' 30". "That has got me licked — I have had six years of the regular army and never anything like that." Laughs, in no way upset over the failure.

5' 30". Again shakes it violently. "I guess it is like shooting caroms — you have got to hit them all the same to balance them."

7' 30". Moves box forcibly back and forth in a straight line, generally a lateral motion.

8' 10". "I do not think it can be done, doctor. You can get three in but not four." Puts it down.

9' 30". Picks it up again and tries in a half-hearted way the same methods. Becomes more interested; keeps on trying.

10' 30". Makes correct motion and gets near the solution accidentally. Gets interested again.

11'. "By George, that is a tough one, doctor. You have got to hold them exactly level.

12'. Puts it down again, then right away picks it up. Is encouraged by making near success several times.

13' 30". "By George, I've got it." Slaps the examiner on the back. Tries to do it again, but really has no idea of the solution.

15'. Continues violent shaking motions, mostly lateral, still trying the same methods. He gives it up without opposition on being asked to relinquish it.

In sum, then, the test reactions disclose an individual with a quite active mind, functioning on an average at a very moderate level but with extreme instability of level. Sometimes he does very com-

plicated things well; at other times he does simple ones poorly. His effort is fairly constant but never great. He shows little reaction to failures. The extreme variation of the performance level would be suggestive of simulation for its very unusualness. An easy-going instability is the underlying characteristic of the whole reaction.

The general situation is one in which explanation would naturally be sought on other than psychometric grounds. The medical opinion is "without psychosis." Yet the account given does not show a quite masculine reaction to the situation as it has developed, and it is difficult to regard the test reactions above described as the product of an altogether healthy mind. While the history bears a healthy aspect, it is not impossible that the fairly energetic reactions there described have represented the temporary compensations of a conflict with reality which have now begun to break down. The patient was discharged to the court and given a suspended sentence with probation, but no further katamnestic data have been obtainable.

Case XXXVII. A man of 19; no special family features. Has attended high school, but has not adjusted well; since worked at various unskilled jobs. There is complaint of many arrests for intoxication, violation of motor vehicles laws and of probation. Brought for opinion by court officer.

Coöperation in Stanford test was agreeable but nonchalant, with impulsive responses casually corrected. The IQ score is 91, and it may be remarked that he passed the ingenuity test, to do which must be very unusual for a person of this score.

In further study the dominant feature was the easy-going way in which errors were made in the presence of intelligence sufficient to avoid them and the difficulty in getting him to see these errors as such. In five cases where he made wrong moves on Healy PC-II he was unable to see superior or even equal merit in the correct move. Some of his rationalizations were:

For the red book he put in the blue book, and concerning the red book, said, "I should think that would do just as well," but saw no advantage in it. He put in the window with the shade, and being shown the correct window, said, "There is no shade in that one either." (He had rejected the 4-pane window also on the ground that it had no shade.) Instead of the ink he put the pencil box, and to the ink said, "His ink is on the desk." He put in a

wrong boy returning from baseball, hesitated on another wrong boy, then put back the first one. Shown the correct one, said, "No, that one (the one already in) is better. The boy is taller and it shows his shadow." ("Would his arm look like that?") At this he smiled and accepted the correction. Things would have to be put to him as clearly as this before he would respond to them. When his attention was specifically called to his errors, he was able to correct them, and in two later instances even did so with fair spontaneity, but improved his moves under suggestion much less than the ordinary.

He did better in tests of a character where he could not escape seeing his mistakes. In the unfamiliar forms test he began doing very poorly, and seeing his errors, at once picked up to do fairly well. The inverted forms test he accomplished with a superior score. He showed only superficial reaction to his errors, smiling easily at them, but at the same time quite able to correct them. Tried with memory for digits, another test where errors would not be so evident to him, he showed a superior memory span, but nowhere in the errors that he did make was there any note of questioning, and there was very little hesitation.

Thus, while he shows fairly intelligent reaction to demonstration of errors, he shows little spontaneous effort to avoid them. Errors must be very evident to him before he will make the effort on his own account of which he is capable. These findings bear out what one would expect from the history and indicate capacity of response to a more coercive environment than he has had, but little likelihood of a change in behavior under the present circumstances.

The dominant feature of the case is the lack of response to ordinary social standards. He appears to have escaped many of the disciplinary consequences of his conduct and to be without special motivation to modify it. Psychiatric findings are negative. A more rigid environment is suggested, but means of providing it, legal or otherwise, are absent. He is regarded by the probation officer as a young fellow of considerable ability along certain lines and some excellent personality traits for whose present state the home environment has been largely responsible. There is, however, no further disciplinary record, save one or two minor offenses against traffic laws. Katamnestic data differ somewhat according to source, but since his visit to the hospital, he seems to have steadied down somewhat. The history is comparable to the conditions of adolescent instability described by some writers.

CHAPTER EIGHT

A METHOD OF MEMORY EXAMINATION ADAPTED TO PSYCHOTIC CASES¹

Organization — Notes on separate items — Trend of observations —
Memory as a psychometric function

Organization. Tests of “memory,” as the word is understood in experimental psychology, are in their clinical application practically restricted to adults. The question is not one of general adaptation to the environment or of a specific occupational ability. There are certain mental disorders which manifest themselves in part through disturbances of memory function. This chapter discusses a systematic means of observing the disturbance.

The content of a standardized memory test is mainly influenced by (1) the relation between immediate and remote memories and (2) special types of test that have arisen largely through their intrinsic convenience, as memory for digits and sentences. The manner in which these are represented in the present test is shown in the accompanying record form for it. On the record form there will be noted at the end of each section two figures separated by a comma (in the first instance, “12, 11.8”). In each case the former of these figures denotes the maximal scores (in points) assignable; the latter figure denotes the adult average as far as determined. The present norms are based on tests of a group of fifty normal adults. An average group of human subjects is difficult to select *a priori*; witness the history of the average adult mental age. In the present experiment certain sections embody tests whose normal average is already studied (substitution, figures forward and backward). In these cases the

¹ Based on an article by F. L. Wells and H. A. A. Martin in the *American Journal of Psychiatry*, Vol. 3 (1923), pages 243-257.

BOSTON PSYCHOPATHIC HOSPITAL

PSYCHOLOGICAL LABORATORY

SERIES 6

MEMORY

Name.....Birth-date.....Date.....Time.....House
O. P. D.

Foreign Lang. Diff...None; Some; Marked....School Grade.....at.....years

Occupation.....Willingness.....Effort.....Phys. Act.....Speech.....

Examiner.....

1. Name
2. Where born
3. Birthday
4. Age
5. Married
6. Children (BS)
-12, 11.8
7. Who Pres.
8. Who Gov.
9. King Engl.
10. Boston-Springfield
11. What made in Lynn
-10, 7.2
12. Ft. in yd.
13. Inches in ft.
14. Cap. U. S.
15. Pts. in qt.
16. Cents in dollar
-10, 9.1
17. Alphabet
18. 20-1
-20, 18.4
19. Substitution
-17, 13.8
20. Sentence memory
- 12 16 20 24 28
-10, 5.7
- Remarks

21. Figures forward
- 2751 83961 627195 6153827 72816495 384169527
- 7482 94158 529473 3625918 26184739 742615839
-12, 6.3

22. Worcester		23. Burketown				
Lowell		Appleby				
Portsmouth		Linkwood				
New Haven		Edgerly				
Providence		Faunsdale				

-10, 8.2
24. Figures backward
- 263 6915 37294 697384 1948625
- 847 4163 94271 385927 9582731
-10, 5.1

- 25.
- comb
- eraser
- key
- pencil
- safety-pin
- salt-shaker
- soap
- sponge
- spool
- thimble

26. Recognition Memory

A			
B			
C			
D			
E			
F			
G			
H			
I			
J			
K			
L			
M			
N			
O			
P			
Q			
R			
S			
T			
U			
V			
W			
X			

.....24, 15.3

Provisional norm for this record.....

Points credited.....MQ.....per cent

averages of the present normal group correspond closely to the generally accepted determinations. It is thus not unlikely that the writers were fortunate enough to have access to a fairly average group for the norms current. The actual score in each section is written at the left of the two figures just described, as shown in the reproduction.

The principal omission is perhaps an item for "logical" memory; that is, the memory for a connected train of thought, such as the fire episode of Stanford X-4. Many passages such as the "cowboy story" are already in common use for this purpose. Directions for giving the test are reproduced as follows:

Items 1-6 (old personal information). Questions should usually be phrased conversationally. If practicable, they should be so arranged that their import is not apparent till the last word; thus "What is your birthday?" rather than "What day were you born?" Each item to which correct answer is produced in 2 seconds or less scores 2 points. Each item to which correct answer is produced in 2-10 seconds scores 1 point. Longer delayed or wrong answers score zero. In Item 3 the *year* of birth is not required. If the subject is unmarried, "Brothers or Sisters" may be substituted in Item 6. Total points 12; current norm 11.8.

Items 7-11 (current information). Give and score the same as Items 1-6. Item 10 inquires which is larger, Boston or Springfield. If the subject is from another region, the content of these questions should be modified accordingly. The standard questions should be so framed as to be suitable to the regions from which most of the subjects come. Total points 10; current norm 7.2.

Items 12-16 (common information or school knowledge). Give and score the same as Items 1-6. In Item 9 the name is sufficient without the number. Item 14 should be phrased, "What city is the capital of the United States?" Unless certainly clear in this form, the words "where the President lives" should be added. As in Items 7-11, occasional circumstances will necessitate considerable change in the content of these questions; they must be modified

according to the locality where the patient lives. Total points 10; current norm 9.1.

Item 17. Subject may be started off with the first few letters. Score 10 if entire alphabet is repeated in 10 seconds or less. Score 5 for correct repetition within 1 minute. Score zero if any mistake. Half credit may be given for correct repetition after slip of the tongue, subject being told to repeat.

Item 18. Subject may be started off with the first two or three subtractions. Score 10 points if correct within 20 seconds; 5 if correct within 2 minutes. Score zero if any mistake. Items 17 and 18, total points 20; current norm 18.4.

Item 19. Make as a performance test as described by Pintner and Paterson (2, 63) or in the "Condensed Performance Tests" of the Psychopathic Hospital. Find the age level of the performance, and score a corresponding number of points. Total points 17; current norm 13.8.

Item 20. Use such sentences as those given at the close of this volume (Appendix VIII). Give one sentence of each length, beginning at 12 syllables, until there is a reproduction with more than one error, not more than 28 syllables. Score 2 points for each sentence repeated correctly; 1 point where one error. Total points 10; current norm 5.7. (Recently the practice has been adopted of giving two sentences instead of one, and thus allowing each correct repetition half as much credit as previously.)

Item 21. Use the sets of digits published in Wells and Kelley, "Intelligence and Psychosis," *American Journal of Insanity*, Vol. 77 (1920), page 41, from which those provided on the blank are taken. Beginning with 4 digits, give two series of each length until there is a failure with both series of one length, not beyond 9 digits. One digit per second. Record each set of figures, appending a check mark to each to show whether or not correctly repeated. Score 1 point for each series correctly repeated within the given limits. Total points 12; current norm 6.3.

Item 22. On being given verbally the name of a city or town, the subject is to respond with the state where it is located. This item

embodies five towns familiar to New Englanders; with persons from elsewhere, towns of corresponding familiarity should be substituted. Illustrate task with Boston or equivalent example. With high-grade subjects the routine of a controlled association test may be followed, the town names alone serving as stimuli. Usually it is preferable to say each time, "In what state is (Worcester)?" etc., the final word being always the critical or stimulus word. Score 2 points for correct response in 2 seconds or less; 1 point for correct response in 10 seconds; zero for incorrect or more delayed responses. Total points 10; current norm 8.2.

Item 23. (This item is omitted and scored zero if less than 5 points are scored in Item 22.) Explain that in this series names of unfamiliar towns are to be used (see page 184; names and locations taken from United States Postal Directory, only one post office of each name in United States) and that subject is to learn states in which towns are located so that he can give them about as well as the previous ones. The locations are respectively Burketown, Va.; Appleby, Texas; Linkwood, Md.; Edgerly, La.; and Faunsdale, Ala. Recite the towns and their approximate states to the subject once only, at the rate of one pair every 5 seconds. Then review as in Item 22, but in irregular order. Unless a right response is given in 10 seconds, tell the subject the correct response and proceed to the next stimulus word. Repeat the series of five names four times in irregular order. Score as in Item 22. Total points 40; current norm 16.5.

Item 24. (This item must not be given immediately after Item 21.) Proceed as in Item 21, except for beginning with series of 3 digits instead of 4, and ending with 7 instead of 9. A 3-digit series may be used for illustration if necessary, the subject being drilled on it until he gets the idea of repeating backwards as clearly as practicable, followed by two other 3-digit series. Score 1 point for each series correctly repeated, as in Item 21. Total points 10; current norm 5.1.

Item 25. Have the ten objects (names on blank) in a covered box. Remove objects one by one from box; hold them to subject's view, making sure he sees them distinctly. Subject names objects without touching them. Replace objects after all are shown. Score

1 point for each object named within 2 seconds and without stumbling in speech. Total points 10; current norm 9.9.

Item 26. Material consists of 24 picture post cards illustrating natural scenery, from regions essentially unfamiliar to subject. In all pictures of a series the corresponding axes of the cards should, in position for viewing, be parallel to each other. The backs of the cards should be conspicuously lettered A-X inclusive, this lettering being concealed from the subject. The subject is told in detail that he will be shown 12 picture post cards which he will be asked to identify among 12 others. The cards should be laid face upwards before the subject, each succeeding one covering the last previous, one every 5 seconds. As each card is shown there is placed opposite its corresponding letter, in the second column of the record form, a number indicating its order of exposure; thus, the first card shown is numbered 1; the second shown, 2; etc. When 12 cards have thus been shown, they are shuffled with the remaining 12. Thirty seconds after the last previous exposure the entire series of 24 cards is shown to the subject one by one, each succeeding card covering the last one as soon as a decision is announced by the subject. If the subject answers that he saw a card among the first exposures, a plus sign is placed opposite its letter, in the third column of the record form. If he answers that the card was not seen, a minus sign is there placed. Judgments are rated plus or minus, regardless of degree of confidence. If no decision is given within 1 minute, it rates as unseen. When the 24 cards have been noted, the second and third columns of the record form are compared to derive the fourth column. In the second column, numbers are equivalent to plus signs, blanks to minus signs. Accordingly, like signs give plus in the fourth column (a correct answer); unlike signs give minus (an incorrect answer). The number of plus signs in the fourth column is entered at the foot of the second column; the number of minus signs there, at the foot of the third column. The score in points is the number of plus signs in the fourth column less the number of minus signs there (right minus wrong) and is entered at the foot of the fourth column. Total points 24; current norm 15.3.

General. The total of possible points in the experiment is 185. The current norm is 127. Final results are expressed in terms of the per cent which the total point score earned is of the current

norm. If for extraneous reasons any item cannot be accomplished, as Items 19 or 26, owing to difficulties with vision, the score is prorated accordingly. Thus, current norm for the substitution test is taken as 14 points; for the recognition memory test, 15 points. In an experiment where these are omitted on account of visual difficulty, the current norm would be 127 less 29, or 98. When an item is thus omitted, an *X* mark should be entered at the place for its point score. The examiner may also rate constructively, according to other performance, any single questions it may be necessary to omit in such items as 1-6. Spontaneous alteration of any response cancels the response which has been altered, provided only that no credit is earned for a response corrected after its time limit.

Notes on separate items. Scoring is by points and according to the time of recall as well as accuracy, in so far as such processes may be timed with a stop watch. Two seconds was fixed as a reasonable upper limit for associations susceptible of ready recall. In general an item accomplished within 2 seconds scores 2 points; up to 10 seconds, 1 point. The twenty-six items of the test divide themselves logically into paragraphs — the first six items dealing with the most ingrained personal associations, the next five with current information, the next five with school knowledge, etc.

Although sentence memory is a familiar form of test, no really satisfactory sentences are available. The unsatisfactory character of syllable number as a criterion of difficulty has become more apparent as experience with the present sentences has accumulated. The practice of giving at least two sentences of each length, as already noted, is to be commended.

In series of digits used for memory testing it has been thought undesirable to have repetition of a digit within a series, or such successions as 2-3, 5-7, or 8-7. Such have been avoided in the present series. Attention is directed to the advisability of dropping the voice to signify the close of a series. If this is not done, the patient may become confused

waiting for additional digits, and one is measuring much else besides memory span.

Items 22 and 23, dealing with geographical names, are discussed at some length in a subsequent paragraph.

The inclusion of a test for naming common objects indicates the liberal sense in which the present test construes the memory function. It was designed to observe aphasic tendencies. It may be noted that the relation of the two processes has given to a type of aphasia the name "amnesia." Occasionally also it has been a clinical gauge of a formal "thinking difficulty" sometimes seen in benign depressions.

The post cards used in the recognition memory item were a Yellowstone Park series, but it was not intended that the norms should apply to this set of views alone. No reason is apparent why any generally similar collection of views should not be used. Another, based on White Mountains material, is now being used with satisfactory results. The source of this material has been *Little Phostint Journeys*, of the Detroit Publishing Company. An ordinary thousand-card filing box is convenient for housing the material of the last two items.

In clinical psychometrics it is often desirable to present the scores in a manner especially intelligible to persons but little acquainted with the special techniques by which they were derived. From the examiner's own point of view it is also advantageous to get the scores on the various divisions of the test so that they will be mutually comparable. The ordinary means of doing this is to convert the scores into percentile terms, showing, for example, the per cent of all subjects which the individual surpasses (cf. Alpha test, page 295). This requires a larger body of normative data than is available in the present case. It has also the limitation that very considerable differences near the upper end of the scale are negligible in percentile terms. Thus a difference of 155 and

205 points in Alpha score are both within the uppermost 5 per cent. The plan adopted in the present instance is illustrated in the diagram on page 179 and may be described as follows:

A table was constructed showing the per cent which any given point score in a paragraph is of the average point score for that paragraph (Appendix X, page 298). The farther such a percentage is above 100, the more above the average, and vice versa. Then a chart was drawn whose ordinates show a zero line and 100 millimeters above it an average line. The scores in the successive paragraphs of the test are laid along the abscissa. The percentage score obtained for a given paragraph is charted its own number of millimeters above the zero line. The upper limits of such percentage scores are obviously unequal for the different paragraphs. For old familiar associations the average score is practically maximal. For digits backward it is barely half of maximal, and for recognition memory about two thirds of maximal. The vertical lines of the chart represent the proportion which the mean variation of the normal cases bears to the average. This is closely related to the relative difficulty of the items; easy items show little variation, difficult ones relatively much variation. By this means it is shown where a given score lies with reference to normal variability. Thus the subject whose record is shown on page 179 scores below normal limits in all items save old personal information, current events, and recognition memory.

Trend of observations. In a general way it is recognized that organic conditions are more subject to memory defect than the functional ones, and this condition is reflected in the scores of the available material; but the memory function as a whole does not vary sufficiently among mental conditions for any test of it to be differential. On the other hand, there are many special aspects of the memory function which are

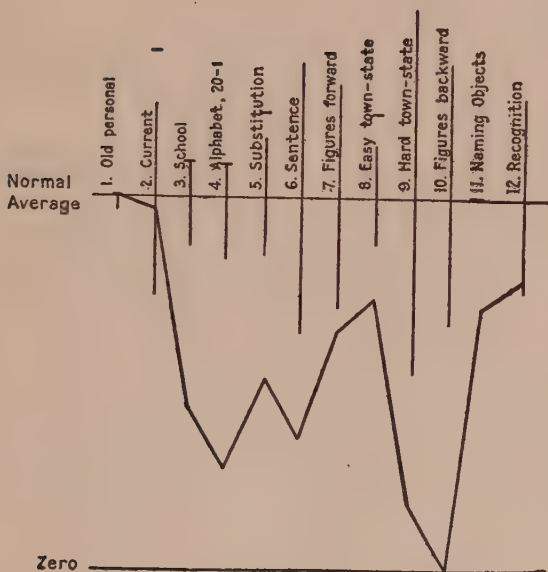
BOSTON PSYCHOPATHIC HOSPITAL MEMORY CHART

NOTE:-- 1 mm. of elevation on scale represents one per cent. of range between zero and average.
The lines crossing the normal average line represent normal limits. The short lines placed above the normal limit lines indicate the largest score assignable.

Remarks

Name Desjardins
Date 2-1-22

Examiner B. H. W.
Company B.C.C.



open to examination as to differential effects in psychotic conditions. The present type of memory test admits of twelve such distinctions, though the measurement of each is rather cursory. Of 179 records entering into these calculations, the following were the "memory quotients" and numbers of cases in five classified groups, with ten or more cases each:

	No.	TEST SCORE
Dementia præcox	24	93
Manic-depressive depression	16	86
General paralysis	18	77
Other organic brain conditions	19	75
Paranoid conditions	11	77

The following table gives the median percentile rating for the six groups in the twelve divisions of the test:

MEDIAN PERCENTILE SCORES OF CLINICAL GROUPS IN SUCCESSIVE DIVISIONS OF THE TEST

	No.	OLD PERSONAL	CURRENT	SCHOOL	ALPHABET, 20-1	SUBSTITUTION	SENTENCES	FIGURES FORWARD	EASY TOWN-STATE	HARD TOWN-STATE	FIGURES BACKWARD	NAMING OBJECTS	RECOGNITION
Dementia præcox	24	100	111	110	109	65	123	111	110	97	78	100	111
Manic-depressive depression	16	100	111	99	109	58	88	95	110	42	98	100	78
General paralysis	18	100	111	110	109	58	88	79	122	18	59	100	65
Other organic brain conditions	19	100	83	99	54	44	105	79	122	48	39	100	78
Paranoid conditions	11	100	97	99	109	58	88	111	98	61	78	90	92
Miscellaneous	37	100	111	99	109	73	105	79	110	67	78	100	92

In the "old personal" items no distinction appears, and this situation is almost as clear in the items of school knowledge and the naming of common objects. Elsewhere there is more evidence of differential effects. The items of current information have a low value for the "organic" group. In

this group are included organic psychoses outside of general paralysis, the diagnostic classifications being: psychosis with arteriosclerosis, 5; psychosis with organic brain disease, 4; organic brain disease, 3; senile psychosis, 2; senile dementia, cerebral arteriosclerosis, psychosis with brain tumor, psychosis with organic brain disease and "nervousness," multiple sclerosis, 1 each. This group presents a conspicuously low score in the alphabet and counting backward, also in digits backward, while showing an especially good score in the easy town-state items. The greatest departure from the normal recorded is that of the general paralytics in the hard town-state items, accompanied by a better than normal average performance in the easy town-state. Relative to functional psychoses this group shows inferior performance in digits forward and backward and in recognition memory. The manic-depressive depression group, the next most affected, shows its lowest score in the hard town-state and substitution items, both dealing with new associations. This is somewhat out of accord with what would be expected from the classical "thinking difficulty" of this condition and points toward some revision of this concept. Least of all is the general function affected in the schizophrenic group; most itemized scores are indeed above the normal average. While practiced and rote memories are relatively good, considerable difficulty is found with the substitution test. The difficulty with figures backward was not seen in another group observed for this function (20, 23).

The items most unfavorably affected in the psychotic conditions are thus the substitution and the hard town-state, which are reduced to nearly half the normal average. Outside these, with the digits backward and recognition memory items, unfavorable effect on the test is little indicated; indeed, the easy town-state items average somewhat superior to the normal thus far observed.

Mental-defect conditions are not sufficiently represented for distinction in the present data. Their responses would be of comparative interest, but they do not as a group present clinical questions to be dealt with in this type of examination. It will be borne in mind that the above data have accumulated through requests for the examination with cases selected by the physician. They do not represent unselected samplings of the clinical groups.

Memory as a psychometric function. In the broadest sense, memory denotes a storing up of past experience. The steel needle permanently magnetized "remembers" having been drawn across another magnet. Memory may also denote generally the modification of behavior by experience. In its ideational aspect this is nearly synonymous with intelligence. "Practice," "learning," and "conditioning" are terms used to denote other special aspects of memory functions. In the present sense the memory process or remembering means recalling an idea to the introspective consciousness. As such, the terms imply a recognition of thinking as a form of organic activity. The only available evidence of such activity is some overt act on the part of the subject, such as putting an idea into speech. Some thinkers, *sit venia verbo*, accordingly prefer to eliminate the subjective phase entirely and deal only with overt responses. The difference is principally one of dialectics (81), though in this presentation the ideational factor is recognized.

In the psychometric sense, the evidence of memory is the ability to act in accordance with a given idea, as in repeating a nonsense syllable or paired associate. Normally (disregarding hysteria and dissociative processes generally) the idea must have been conscious to the "main personality" in order to find expression. A person is then said to have a good memory when ideas from past experience will come into his mind as occasion for them arises. If they will not come

at such a time, the memory is poor. The memory test, therefore, is one directed primarily at measuring the facility with which ideas are recalled on occasion (i.e., the corresponding overt response made). Psychologically there is no sharp line between memory and controlled association. Both names denote a previously established association, measuring the facility of reestablishing it. The past experience in a memory test may be uncontrolled, as in asking the date of birth, or it may be controlled, as in the repetition of a series of digits. In the former case it is largely a matter of convention whether one speaks of memory or association. Tests where the experience is controlled are uniformly spoken of as memory tests.

Another conventional separation of memory and association experiments is concerned with the time factor. An opposites test is of course a memory test, in that it depends on recalling from past experience the proper responses. But it is expected that one will recall them, and emphasis is laid on the time taken to do so. In most "memory" experiments the time factor has been less regarded, and the emphasis is on whether the memory is recalled at all. In these conceptions one loses sight of the continuity in the ease of recalling one's own name (association) and the difficulty of recalling what one had for breakfast the previous morning (memory). The memory for an idea is better when it is recalled in 1 or 2 seconds than when it takes 7 or 8 seconds. The time of recall is a criterion of the accessibility of the idea of consciousness. In the experiment just described two such levels of accessibility are distinguished — on the one hand, when the idea is recalled almost immediately or within 2 seconds; on the other hand, when the idea is recalled only after brief reflection or up to 10 seconds. By such means one obtains much finer differentiation in grades of memory than in experiments depending simply on recall or non-recall.

Below the two levels of recall above mentioned is a level at which recall is possible but rather uncertain. Either an idea may not appear when appropriate, though it does so incidentally, or when it appears it is not clearly recognized as the appropriate one. Below this must further be distinguished a fourth level, that of ideas not recallable to the ordinary waking consciousness at all.

It may be illustrated briefly how these distinctions appear in the observations forming the basis of Items 22 and 23 in the experiment discussed (82). The "familiar" towns used were Worcester, Mass., Haverhill, Mass., Portsmouth, N. H., Providence, R. I., and New Haven, Conn. The "unfamiliar" towns were as follows: Burketown, Va.; Appleby, Texas; Linkwood, Md.; Edgerly, La.; Faunsdale, Ala.; Gladbrook, Ia.; Hogansville, Ga.; Minster, Ohio; Tillson, N. Y.; Wallston, Pa.; Dunning, Neb.; Chartley, Mass.; Jethro, Ark.; Kenton, Tenn.; and Mountfort, Wis. These "unfamiliar" town names were selected as the names of fourth-class post offices, only one of each name being listed for the United States at the time the list was constructed. The method of presentation was similar to that used in the test described.

The table on page 185 recites the record of Subject A for the five "familiar" towns and the learning of the first five "unfamiliar" towns used in the test.

In this record the learning of *Burketown* and *Appleby* is relatively easy, that of *Linkwood* and *Faunsdale* quite difficult, *Edgerly* occupying a midway position. The order is *Appleby*, *Burketown*, *Edgerly*, *Linkwood*, and *Faunsdale*. Why these items should vary so in difficulty is interesting, but more pertinent are the irregularities of their own learning curves. *Appleby*, after being apparently well established at the first level, in the fifth recital sinks well into the second; *Faunsdale* in the fourth and fifth trials emerges to the second

		TRIAL							
		1	2	3	4	5	6	7	8
Worcester	9	20	13	16	13	9	7	11	8
Haverhill	6	10	14	9	7	38	7	10	9
Portsmouth	6	26 Neb.	36 Neb.	X	26 Ala.	53 La.	62	12 Ala.	10
New Haven	6	46 Va.	26 Tex.	20	74	50 Ala.	10 Ala.	23	12
Providence	11	15 Tex.	11 La.	17 La.	17	24	21 Tex.	21 Neb.	78

Times of correct recall are in fifths of a second. X denotes no recall. A wrong recall is both timed and named.

level and then drops to the fourth again. *Edgerly* fluctuates between the third and fourth.

Considering the entire series of fifteen unfamiliar place names, the following table shows the frequency with which the various levels of recall occur as the learning curve progresses. The earlier portion is dominated by the fourth, the latter by the first level:

NUMBER OF RECALLS AT VARIOUS LEVELS IN EACH OF SUCCESSIVE GROUPS
OF 75 TRIALS

	SUBJECT A				SUBJECT B			
	GROUP				GROUP			
	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Recalls at first level (within 2 seconds)	1	13	25	38	27	35	50	35
Recalls at second level (within 10 seconds)	27	24	27	33	24	30	20	18
Recalls at third level (after 10 seconds or corrected after false recall)	3	14	16	2	3	3	4	2
Recalls at fourth level (uncorrected, false recall or non-recall)	44	24	7	2	21	7	1	0

This table shows a comparison of two subjects in a learning process similar to the above. The subjects are both young men, Subject A having a Stanford IQ of 70, with a mildly deteriorating schizophrenic condition; Subject B is a cyclothymic case with an IQ level of about 100. The groups, *a*, *b*, *c*, *d*, represent each the sum of five consecutive trials in a series of fifteen unfamiliar towns; 75 trials per group or 300 trials in all for each subject. Subject A learns much more slowly, having but one recall of the first level in Group *a* to 27 for Subject B, but this lead is much cut down at the end. The second and third levels do not greatly change in frequency, because they lose items to the first level and gain them from the fourth. Ultimately all items should be recalled at the first level. In terms of the test norms now available, Subject B is rather better than the average and

Subject A at least as much below it. His directive thinking is more sluggish and less accurate.

REVIEW QUESTIONS AND EXERCISES

1. What is the relation of the terms "memory" and "association" from a psychometric standpoint?
2. Discuss the "levels" of effectiveness in recall that may conveniently be distinguished.
3. What is the general relation of the scores in the memory test ascribed to various clinical groups?
4. Various portions of the test, especially the hard town-state, may be shown as class experiments.
5. With projection apparatus the recognition memory test should be conducted as a class experiment.
6. The instructor should demonstrate the method in at least one case, but preferably with a normal individual of *average* intelligence and with two or three cases showing clinically a memory disorder.
7. With projection apparatus a few profiles of the test may be presented and discussed.

CLINICAL MATERIAL OBSERVED WITH SPECIAL REFERENCE TO
MEMORY FUNCTIONS

Case XXXVIII. A woman of 42; history very meager, but negative as far as obtained. Reached eighth grade; has worked for a living ever since, earning very moderate remuneration. Recently she has been unable to obtain work at a living wage; became depressed; was observed one night gazing at the river in a suspicious manner and was brought to the Hospital by the police.

The picture was not clearly a "depression," though anxiety, tension, and apprehension were marked, but there was some evidence of physical changes, pointing to an organic disorder, with resulting impairment of economic efficiency. As such a condition would be likely to show anomalies in the memory sphere, she was referred for examination thereof.

A Stanford rating obtained by way of a reference point showed an IQ score of 79, which would be fairly consistent with the rest of the history as it is known. The scale was abbreviated on account of visual difficulties (eyedrops).

In the twelve divisions of the memory test she was below normal limits in school knowledge; the substitution test, digits forward and backward, memory for sentences, and recognition memory were also far below average. The time in seconds which each of the ten lines of the substitution test took, was as follows: 18, 37, 18, 21, 19, 19, 18, 16, 23, 15 — very little learning being evident. Most of her failures in the recognition items were saying she had seen a picture which she had not, the reverse of the ordinary type of error. The record made the impression of an abnormal situation in these functions, though the general score, 87 per cent of average, is hardly below normal limits. Organic changes are also sometimes reflected in motor disturbances. The so-called "tapping test" is accomplished in a normally rapid and orderly manner, as shown by smoked-paper record. Simple reaction time was practically average for the stimulus used, slightly over .200 second. These observations showed no evidence of other formal disturbance. Psychiatically the patient was found to be without psychosis, though the test record points to some kind of disorder in the thought processes. No change in her condition was noted during a brief period of observation, after which she was discharged to the care of her family.

Case XXXIX. A man of 30, third of eight children; negative family history. Completed grammar grades; has worked along

general mechanical lines; economic and social adjustment is somewhat above average. Worried considerably for a year or more over difficulties with love affairs. Then in response to further upsetting events there developed an acute episode with excitement, confusion, and semi-stupor. He was brought to the hospital, but the disorder had already begun to subside, and within a few days he again presented a quite normal appearance.

Stanford examination three days after admission yielded an IQ of 83, probably lower than normal capacity. A memory examination made the following day still disclosed certain anomalies in the accessibility of its material to consciousness. Memory for digits and sentences was well above average; nothing unusual appeared in the "old personal" items, the alphabet, or 20-1. Current information was disturbed; he hesitated on the name of the President, and for the governor of the state and the king of his native country he gave the names of previous incumbents. Neither did he get the easy town-state associations well, and he could make nothing of the hard ones, except for one, which established itself promptly and firmly. The better performances seemed to be where immediate memory was the governing factor. If an interval elapsed between the new association and its recall, there was more than the anticipated difficulty, and the older associations were quite generally disturbed.

The case was diagnosed as an acute schizophrenic episode. In an organic condition one would expect to see more effect on the immediate memory and less on the remote. Not enough is yet known of the psychology of such disorders as this to interpret satisfactorily the psychometric anomalies beyond the evidence of a formal disorder of thought processes in an episode of essentially psychogenic character. No katamnesis.

Case XL. A woman of 31, third of five children; home atmosphere rather repressive; of a quiet disposition; food idiosyncrasies. Good educational history; has since done library work satisfactorily. Psychotic symptoms began after the death of an older sister, in the form of depression with feelings of fatigue and inadequacy. She tried to work for some days after she was incapable, and it was necessary to remove her, as she could do nothing for herself. Just before admission there were confusional symptoms, but these subsided in a few hours. The superficial mental symptoms were those of an underactive, undertalkative, benign depression, but there were neuro-

logical features that pointed to the presence of organic factors, possibly post encephalitis, though there was no history of such infection. Similar question is raised in the memory examination, whose report ~~it~~ follows :

"The patient when seen was very quiet physically but seemed mentally alert, smiled readily, and answered ordinary questions with entire promptness. She complained of her memory. Given the usual memory tests, she was somewhat above average in all processes dealing with the immediate recall of rather familiar material. In respect to the forming of new associations of a relatively complex type, she was uniformly below average and even outside normal limits. The chief feature of the record is that this is not the usual type of difficulty with a retarded depression. It is rather the type of memory loss that is seen in organic conditions. Remote memories are well retained and recent ones more unstable, as here. In the so-called 'thinking difficulty' of benign depression, one is more apt to see delay in the reproduction of quite familiar associations and not much more delay in the reproduction of more difficult ones. Indeed, it has been observed that the more difficult process is actually more quickly accomplished than the simpler."

The patient left the hospital with some subsidence of the symptoms, but not recovered. Katamnesis is lacking beyond the negative fact that no application for treatment has been received for a period of a year. This would be consistent with a benign functional character of the disorder, for which, it must be granted, the stage was psychogenically set.

Case XLI. A man of 46; heredity negative; grammar school education; has worked in sales positions and been in business for self. Economic reverses; present situation difficult. A history of previous depressions upon a rather quiet and seclusive make-up showed the picture of a mild depression without retardation; no evidence of disorder of thought processes. Recovered sufficiently to go to work for several months. With return of depression and complaint of poor memory and inability to think quickly enough for his business, he was referred for experimental study of these processes.

The memory test scores practically at adult average, and the sections are nowhere below normal limits. The record is more regular than is usually seen, but best record is done in the substitution test, which is above the normal mean variation. No basis for the complaint of difficulty of thought is found in these data.

In a Kent-Rosanoff free association test (cf. Chapter IX) no anomaly was disclosed, either in respect to length of association times or the frequency of the responses; the figure for the latter was rather greater than average, but the more relevant point here is the quickness of the times. A precise study was made of the reaction time processes with a d'Arsonval galvanometer arranged as a chronoscope. Ten simple reactions with the right-hand average .183 second, mean variation .010 second; left-hand .188 second, mean variation .008 second. Choice reactions to material of varying complexity averaged .481 second to black and white, 1.410 second to correct and incorrect additions, 1.010 seconds to correct and incorrect statements; but mean variations were from one fifth to one fourth of these figures. These figures are all well up to normal average for the conditions of the experiments, and the whole series of observations is so much more evidence that the so-called "retardation" of the benign depression is inaccurately named.

After a few months the depression assumed a more serious aspect, and it was necessary for the patient to seek hospital care.

CHAPTER NINE

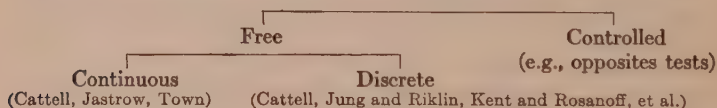
THE FREE ASSOCIATION EXPERIMENT

Nomenclature — Early development — Systems of treatment — Reaction time — Logical categories — The Kent-Rosanoff experiment — Complex-signs — Routine of giving — Word lists — Association types and secondary factors affecting them — The opposites test as an adjunct — The test as influenced by affective psychosis — Normal applications

Nomenclature. The term “free association experiment” is here used to designate the familiar procedure in which the examiner speaks a stimulus word, to which the subject responds with “the first word it makes him think of.” The terminology in the field is a little confusing and may be made clearer by the accompanying tabulation :

ASSOCIATION

(From the standpoint of a quantitative study of the thought process)



The discrete phase of the free association method, which is here discussed, is the association experiment *par excellence*. In certain industrial applications the method has been termed the “word reaction” test.

Early development. The experimental study of the thought processes from the point of view of association began with Galton (83) shortly before 1880, and its practical bearing was quickly appreciated. The subsequent development is foreshadowed in Cattell’s early articles (84 and 84 a). The present intelligence tests are largely made up of controlled association tests of one form or another. The first systematic studies of free association tests were also the work of Cattell. During this earlier period attention was largely

focused on logical or grammatical relations of response and stimulus word; considerable literature grew up around this point of view, but its psychometric bearings are quite indirect. In later studies, instead of taking the response word as the sum total or at least the essence of the reaction, the tendency is more to treat it as the *symbol* of whatever complicated group of processes may be aroused by the stimulus word and try to establish the meaning of these symbols for the mental life of the subject. With this conception begins the living history of the "free association test."

Systems of treatment. More or less objective evaluation has been attempted in various ways. The earlier attempts were concerned with grammatical or rhetorical relations of stimulus and response words. These were considered from the point of view of the thought processes as an intellectual function, and the early ideas of individual differences in responses were of differences in intelligence. The controlled association processes gave a ready cue for such interpretation. The facility with which words are produced under "free" association conditions (e.g., 60 words in 3 minutes) has been brought into clear relation with intelligence (1, 272). The number of different response words produced to say 100 stimulus words has a similar meaning (85). As an instrument for "intelligence" measurement, these methods are inferior to the controlled association procedures that characterize language tests of intelligence. The use of the method as a guide in personality study is dominated by the work of Jung and of Kent and Rosanoff. Jung succeeded in bringing the quasi-grammatical conceptions of his procedures into closer relation with underlying psychological factors in the test and gave a new direction to the manner in which the association time was regarded. Kent and Rosanoff disregarded the time and the logical category as insufficiently objective; they developed means for measuring the tendency

to usual or unusual responses and sought to relate this function of the test to more fundamental features of the personality. Other features of the test reaction have been systematically observed, such as "reproduction" and other indicators of special complexes. The association time, the logical categories of responses, and the frequency of responses are the features of most general interest, each of which is more specially considered in its turn.

Reaction time. There are two distinct methods of measuring the association time. The classical one is to "do it electrically" by means of chronoscope and voice keys. Such a procedure has but limited clinical possibilities. Clinical observations have been made almost entirely with the stop watch. From the physical standpoint, the two methods have been closely compared by Dunlap (86). He finds average differences between the measures up to 400 sigma, chronoscope readings being generally shorter. The average difference was 194 sigma. Factors tending to make chronoscope readings shorter than stop-watch readings are: (1) a tendency of the experimenter to start the stop watch at the time of beginning to speak the stimulus word (voice keys are subject to certain lags, according to the nature of the initial sound); (2) the halting of the stop watch includes the reaction time of the experimenter to the subject's voice (this is probably greater than the lag of the subject's voice key) (87).

The greater precision of the chronoscope method is not questionable, but whether it is worth its cost is seriously so. From the point of view of personality or "complex" diagnosis, no significance attaches to differences which are not many times 200 sigma and therefore not less observable by the stop watch than by the chronoscope.

Moreover, an association experiment timed with the stop watch is hardly the same experiment as one timed with the chronoscope. Except for its own noise of starting and stop-

ping, the stop watch concentrates attention on the stimulus. The chronoscope divides it between stimulus and recording apparatus. From what is known about the test, the artificial conditions introduced by chronoscope technique may be expected to obscure natural reaction tendencies much more than the stop watch. Jung has some discussion of this point (88, 228).

For this reason a stop watch that is noisy in operation is undesirable. Various kinds, with side levers, operate nearly without noise; otherwise, however, they are somewhat less convenient to operate for the free association test, as they stop and start by a different lever from that which sets them at zero, and the side lever does not lend itself to such prompt manipulation. Most stop watches are graduated in fifths of a second. In Jung's work times are generally recorded and often quoted in fifths of a second, and this is to be recommended for its avoidance of decimal points. Timing to this degree of precision is desirable; more is superfluous. This will not be understood to apply to controlled association experiments, where greater precision should repay itself.

A general mean value for a free association time may be taken as 2 seconds; 1.8 seconds is the figure cited by Jung (88, 231). In experiments of 100 stimulus words, such as those of the Kent-Rosanoff list, a normal range of median association times is from $1\frac{1}{2}$ seconds to 4 seconds. Individual times shorter than 1 second are very seldom recorded. At the opposite extreme, failure of response is sometimes observed and may be recorded if no response is produced in 1 minute. There are, of course, some differences between stimulus words in their tendency to elicit prompt responses. If one examines records of the Kent-Rosanoff test in this respect, one finds relatively long times attached to abstract nouns. One would expect the shortest reactions to be elicited by adjectives with ready opposites, but inspection shows that this is not

greatly the case (89, 13). Jung also notes a general tendency of concrete stimulus words to elicit shorter reaction times than abstract ones, and of adjectives to elicit somewhat shorter times than verbs (88, 235).

In the comparison of individuals the central tendency of reaction times is of less interest than their distribution, more especially the extent to which the measures above the median depart from it. Such departure indicates an obstruction in the thought process that calls for understanding.

The stimulus word in a free association test is symbolically a new situation, in which the subject is quite on his own resources for a prompt and satisfactory response. This results in a longer response time than would be the case if the response had a predetermined direction, as in an opposites test. It takes less time to respond to "high" when the response called for is an opposite than when it is "the first thing you thought of." Even when the "first thing thought of" is an opposite, it takes longer to produce it as the first thing thought of — i.e., in a free association test — than it does as an opposite in such a test (90, 375).

In giving the freedom of choosing the response, there is imposed the task of selecting it from an indefinite range of possible ones, and this introduces many factors that make choice more difficult. From an introspective standpoint, these may be classified as (1) the readiness with which the associations resolve themselves into linguistic form, (2) the predominance of some single associated idea, (3) any factor of willingness or unwillingness to utter the response word presenting itself, and (4) disorganization of the whole process by emotional reaction elicited through the stimulus word (89, 3).

To the extent to which the first of these is operative, the test should function as a measure of language ability or of intelligence as far as the two are related. Jung found shorter

reaction times in "educated" subjects than in uneducated subjects. In 119 psychotic cases observed by the writer, a relationship of $-.31 \rho$ (Murphy) was observed between association time and the Stanford IQ. That is, the higher IQ's went with lower times. Besides lowering the central tendency of the times, language ability should also alter the distribution, as it would shorten the more difficult words to a greater extent than the easier ones.

Practice operates to diminish the influence of all the four factors above mentioned. One finds that long-continued practice with different stimulus words reduces the association time to a limit of about $1\frac{1}{2}$ seconds; a subject already at this level is unlikely to show a practice decrease (91).

The first two of these four factors (none mutually exclusive) are intellectualistic; the last two are concerned rather with the emotional sensibility of the subject or of sensitivity to certain topics.

In the beginning the Jung school was greatly impressed by the latter possibility (88, 227-265), and there was a tendency to regard almost all reactions above the median as determined by special complexes (88, 457). From the hypothesis that emotional disturbance was the sole or at least the overshadowing factor in lengthened time, various formulations arose.

Prominent among them is the formula $\frac{\text{average reaction time}}{\text{median reaction time}}$ as a criterion of the "psychic resistance" of the subject to the experimenter. Practically, this quotient will be increased by any factor that lengthens the association time. A somewhat similar criterion had been suggested for the general emotionality of the subject. Interesting studies from this point of view in the psychology of schizophrenia have been reported by Lang (92).

In most comparisons of men and women in association time, women have averaged longer times than men. Jung

quotes 1.6 seconds as the central tendency for the men observed; 2.0 seconds for the women (88, 231). Although not measured with great exactness, one of the most patent group differences in the psychology of civilized people is the greater "affectability" (Ellis) of women. The frequent situation of a male experimenter would exaggerate differences due to this fact. The general result of this would be the lengthened time in women that is observed, and the group difference that exists is almost certainly to be explained in this way. It becomes more pronounced when one considers especially the delayed times. In a comparable group of men and women, more than three times as many such responses delayed over 10 seconds appeared among the women. The response words themselves are ordinary, and the point has been made that commonplace responses given after long hesitation are, if anything, more significant of emotional disturbance than are individual responses so reached.

The Casons (93), working with the Kent-Rosanoff test, do not find such clear-cut sex differences in the experiment as have been claimed by other investigators. Their work is more recent, and it may be questioned if the findings are not somewhat conditioned by the time and place of experiments. As the Swiss conductor remarked to his complaining woman passenger, "*Bei uns sind die Geschlechter nit e so verschiede!*"

A side light on this matter is contributed by sex differences observed in the Porteus mazes. In this accomplishment girls do not score so well as boys. This finding was studied in relation to personality ratings. "It was found," writes Porteus, "that lack of planning capacity correlated highest for both sexes with inferior success in the Porteus test. Irresolution, — or the tendency to become easily confused when faced with a new situation, — together with simpleness and suggestibility, had the next highest coefficient. Hence it seems fair to conclude that the girls owed their inferior aver-

age record to their greater tendency to lack planning capacity, to become easily confused, and to yield more easily to suggestion" (42, 98).

Linguistic intelligence and emotional sensibility probably have analogous rôles in the association time. To a certain extent, it is as practicable to rule out intellectual factors and to regard such lengthened times as the product of emotional disturbance. But except where other features of the experiment make this practicable, lengthened time is neither a criterion nor an indicator of special emotional reaction. Attempts to relate the measured time to an introspective rating of emotional reaction show a situation much too involved for psychometric use.

Logical categories. In the early history of the method the tendency was toward a multiplicity of categories, twenty or more. Besides being cumbrous, such a scheme was unsatisfactory in that a response might equally satisfy the conditions of more than one category. This last difficulty cannot be wholly overcome, but it is certain that a great simplification of the scheme adopted by Jung from early investigators can be effected without obscuring the differences of the type to which he called attention (94).

These differences are of tendency to react to the experiment in a personal way (*persönlicher Weise der Auffassung*). The presence of such a tendency was first connoted by many reactions of the category termed "predicate." As Jung formulated it, this category included cases where a noun elicited a modifying adjective, or vice versa, and where a verb elicited a subject or object, or vice versa. To this may also be added the use of adverbs as modifiers. English examples would be: *cloud-ominous, flower-pretty, crooked-line, red-rose, scratch-cat, lion-roar, money-wish, invent-machine, weasel-stealth, beauty-rose, safe-quite, almost-grown, sing-well, never-decide, nicely-very*. Other types of response

similarly connoting a personal reaction to the stimulus are: (a) response by a proper noun — e.g., *citizen-New York*, *boy-Johnny*, *mountain-Kearsarge*; (b) responses where a stimulus is taken as a proper name — e.g., *eagle-newspaper*, *park-street* (cf. 94 a); (c) responses which are pronouns — e.g., *hand-you*, *health-me*; (d) responses of *yes* and *no*; (e) failure to respond or repetition of the stimulus word; (f) exceptionally vague or “scattered” responses — e.g., *whistle-nature*, *dream-behave*, *stem-fishes*, *hammer-court* (cf. 95).

Reaction of these classes were subsumed under the name “egocentric” by the present writer. Freyd, who has utilized the system of which it is a part, prefers the term “subjective” (51, 35). The percentage of these reactions in a record has been proposed as a gauge of its feeling value to the subject, and more broadly, of the feeling value to him of situations in general. Fifteen to forty-five per cent of such reactions in a record may be regarded as a normal range.

There is a type of response which names a class to which the stimulus word belongs. It is represented in such examples as *priest-man*, *potato-vegetable*, *lily-flower*, *cow-animal*. It is allied to the “non-specific” category of Kent and Rosanoff and is symptomatic of generally inferior adaptation to the experiment. Practice tends especially to eliminate this group. The name assigned to it is “supra-ordinate.” A fair average of such reactions in an unpracticed subject is 15 per cent. It should be noted that part-whole reactions (e.g., *finger-hand*) are not included in this class.

Where the contrast association is at all available, it seems to be the most facile of all, and this, with its ready and clear definition, makes it desirable to preserve. Naturally it does not occur with equal readiness to all words, but most lists do and all should contain some 10 per cent of common adjectives (such as opposites tests are made of) as a gauge of this

tendency. It shows marked individual differences, is readily determined, and has certain correlations which caused Freyd to regard it as the most efficient score of the association experiment (51, 35, 36).

With the exception of the "speech-habit" group, the remaining responses hardly repay further classification, though it has been made in such terms as relationship by causality, subordination, coexistence, identity (Jung, after Aschaffenburg). These may be placed in a miscellaneous group, together with such few responses whose other assignment may be doubtful. The predominance of this miscellaneous group betokens a concrete (*sachlicher*) reaction type as distinct from the subjective egocentric one, supposedly denoting less personal reaction attached to the experiment, and in broader semblance, to situations in general.

Four subclasses, belonging to the "outer association" group of Jung, are sufficiently distinct from the remainder to be included in a "speech-habit" group. These are common phrases (*stand-pat*); word combination (*play-ground*); sound association (*tease-sneeze*); syntactic change (*high-height*). It is a relatively infrequent group; 5 per cent is a normal average expectation, although pathological conditions may greatly enhance it.

For some purposes it is convenient to know these categories by number rather than by name; thus:

1. Egocentric or subjective
2. Supra-ordinate
3. Contrast
4. Miscellaneous
5. Speech-habit

Though it is difficult to make it a matter of formal classification, attention should be paid to the level of the egocentric or subjective category. The responses may be rather com-

monplace, such as *sweet-candy*, *baby-small*, *thief-steal*, *smooth-glass*, or quite individual and with a content betokening distinct affective response, such as *dream-anger*, *stomach-distress*, *window-joyful* (95, 233). Jung recognized this in the formulation of graded predicate categories, and the present writer has utilized them, but these distinctions are themselves too subjective for quantitative purposes. It is a feature which must be evaluated in the light of the examiner's experience and understanding of the test in general. Jung examined the proportion of "value" predicates and simple predicates in men and women, finding the former relatively about twice as frequent in the women (88, 440, 441).

The tendency of women to longer reaction times has been discussed. Consistently with the meaning attached to this feature, comparative studies show markedly greater tendencies to predicate reactions in women. Huber, studying the grammatical form of responses, observes some 25 per cent more verbs given by women and similarly regards it as expressing a more intense reaction to the conditions by them. Otherwise, however, he notes no special sex difference in response content. (Cf. also 88, 442.)

The only point to be mentioned concerning the relation of association time to the logical category is the tendency of persons with generally rapid reaction times to respond (where apposite) with the simple type of response exemplified in the contrast reactions. In Murphy's calculations also the contrast associations correlate $-.50$, P. E. $.05$ with the egocentric category and $.36$, P. E. $.054$ with the miscellaneous group, indicating opposite mental mechanisms involved.

It has been brought out that association time tends to be shorter with the greater linguistic intelligence. The influence of this factor on the logical category of associative response is less clear. In the classification of "internal" and "external" associations utilized by Jung, the latter were

more numerous in the educated, but this distinction is not confirmed in Huber's work. If one compares on the basis of predicate and allied categories, one finds these slightly more numerous in the educated (resp. intelligent) (88, 129). Correlations figured from the writer's material between certain categories and the Stanford IQ indicated that these functions of the experiment are relatively independent of intelligence level. Thus the r of contrasts and IQ is .09, P. E. .07; that of supra-ordinates and IQ is $-.11$, P. E. .07.

The Kent-Rosanoff experiment. Kent and Rosanoff made records of their experiment (100 words) with a thousand normal individuals. Then they tabulated the responses, so as to record the number of times any word had occurred as a response to each word in the series. Any response in further experiments is then assigned a "value," according to the times it is listed in the frequency tables. Responses not there listed are termed "individual reactions." The particular interest of this experiment lies in its affording a precise measurement of the tendency of a person to respond along the same lines as his fellows or in ways peculiar to himself. This work was published in 1909-1910. The changes in the world since that time have not been without their impress on the normal reaction to the association test. Such associations as *house-garage* or *soldier-France* would have a different value now. It is also probable that the group, large as it was, is a rather selected sampling of associational tendencies. Industrial workers are practically unrepresented. Interest therefore attaches to a new set of frequency tables in preparation by O'Connor (96) with an industrial group, whose associational tendencies are reported to be much more uniform.

It is still practicable to use the Kent-Rosanoff norms as a means of scoring, although the interpretation attaching to different scores may gradually change. The frequency tables consist of an alphabetical list of the responses given to each

stimulus word and attaching to each stimulus word a figure showing the number of times that response occurred among the thousand cases observed. For the purposes of calculation, Kent and Rosanoff divide this figure by 10; thus the association *hammer-nail*, which is recorded 185 times, is assigned a "value" of 18.5.

As a criterion of individuality of response, Kent and Rosanoff suggest the number of individual reactions; i.e., of reactions not found in the tables. Once the frequency value of each reaction is figured, one need only count those having zero values. While hardly so accurate a measure as the central tendency, — e.g., median of all responses, — it is clinically serviceable.

The average number of individual reactions in their normal material is 7, but it is nearly twice as great in persons of "collegiate" education as in those of "common school" education. School children approximate the group of lesser education. Sex differences with respect to the number of individual reactions are not disclosed (97, 9).

A more refined evaluation of the experiment is attained through distribution frequency values. As the figures in the frequency tables are divided by 10, one may include in the first step of the distribution the zero reactions; in the second, those of .1 to .9 per cent value; in the third, those of 1.0 to 1.9 per cent value; and so on. Usually nothing is gained by distributing separately reactions with frequency scores of more than 20 (200 in the frequency tables), though it is well to list the value for each association of this kind. From such a distribution a median may readily be calculated, or if an adding machine is at hand, an average may be taken without distributing.

In scoring by medians, ordinary limits for normal individuals in the writer's experience are scores of 3.0 to 15.0. On the basis of averages, a mass of data is accumulated by

O'Connor (96), the quartiles of record at this writing being based on 662 cases :

75-percentile, 15.7
50-percentile, 13.4
25-percentile, 10.6

As noted, these are mainly industrial operatives, and the differences between O'Connor's and Kent and Rosanoff's data seem essentially due to this cause.¹

If one compares predominance of the first category (ego-centric or subjective) with the median frequency score, one finds marked negative relationship, as would be expected. Correlation of $-.75 r$ is observed in a group of 25 normal cases; for the larger but pathological group evaluated by Murphy the figure is $-.66$. Low frequency scores go with many reactions of the first category. The relation observed between the frequency score and the Stanford IQ is positive, but so slight that this function of the experiment may be regarded for all practical purposes as independent of "intelligence." Durea reaches a similar result in examination of children (64).

Nor has general relationship appeared between frequency and reaction time, though extremely long reaction times show relatively low frequency, consistent with the "complex" significance attached to commonplace responses after a long time (page 198). Although of dissimilar mechanisms ($r = .34$) (90, 372), the contrast and supra-ordinate categories have this in common, that the response words they involve are in themselves usual ones. Hence both show

¹ C. G. Howe, of the General Electric Company, has recently devised for their purposes a much more rapid method of frequency scoring, based on the number of times the most common response word is given. This is easily computed with a stencil and obviates the frequency tables altogether. The current quartiles are 39, 33, and 26, respectively. For certain types of work, scores in the upper half are desirable; for others, scores in the lower half.

positive relationship to the frequency score, this being quite marked for the contrast (r 61) and much less so for the supra-ordinate (r 29). The assumption lies near, that while a high egocentric type denotes difficulty of adaptation on the ground of affectivity, a supra-ordinate association type denotes difficulty of adaptation on the ground of intelligence. This latter, however, is contraindicated by the slightrness of the negative correlation observed between supra-ordinates and the Stanford IQ, — .11, P. E. .07.

In the clinical history of the test since the contributions of Kent and Rosanoff, Mateer's work is especially prominent. Her conclusions indicate that she has found the test especially useful with children (17, 452). She gives discussions of the behavior of the test at different age levels and with different psychopathic groups observed.

Studies of association processes in defective individuals have been made especially by Wehrlin, a pupil of Jung, and by Margaret Otis (98), who utilizes the point of view of Kent and Rosanoff to obtain results essentially consistent with Wehrlin.

Complex-signs. Upon the principle that special emotional reaction will disorganize the associative response has arisen the converse, that disorganization of the response denotes special emotional reaction aroused by the stimulus word or that "a complex has been touched." The ways in which the response may show disturbance are numerous and have been classified as "complex-signs" (*Komplexmerkmale*). An objective evidence of such disturbance, lengthened time, has already been discussed. Pronouncedly affective response words may be taken in the same sense. Other complex-signs may be either those directly concerned with the responses or behavior symptoms of a more general character. Among the former belong failures of response, repetitions of the stimulus word, or perseverative effects; e.g., the same

response is given to the following stimulus word, or a little group of delayed reactions result from an initial major disturbance. A formulation of the behavior disturbances that later grew into the system of complex-signs cited by Pfister (99) is found early in the work of Jung and Riklin.

It is a common practice, introduced by Jung, to repeat the series of stimulus words after first giving, instructing the subject to respond when possible with the same word as previously. To quote Hubbard (100):

I am going to say these same words to you again, and I want you to try to give the same response each time that you gave the first time. If you do not remember what you said the first time, simply say that you do not remember, but if you think you remember the response, say it. You may have as much time as you wish to think of the word.

There does not seem to be, however, any precise standard of instruction for the reproduction experiment. It is accepted that failure or disturbance of recalling the response previously made has the status of a complex-sign. As the arousal of a complex is ordinarily a disagreeable experience, the effect is easily related to the relative disappearance from memory of such experiences, which has been discussed by Hollingworth (101) and more specifically by Griffitts (102). In the latter's studies, at least, the factor also enters that disagreeable affects are likely to be stronger than pleasant ones and produce from this cause more disturbing effects on the recall process.

Working under Jung's influence, Pfenninger (103) and also Aptekmann (104) studied the tendency to alter responses through series repeated several times as associated with other complex-signs. It appeared definitely related to other complex-signs, though it was somewhat more pronounced in the men observed, other signs being more pronounced and persistent in the women.

The behavior symptoms selected for study as complex-signs by Dooley (105) were :

1. Long time
2. Perseveration
3. " Vacuum "
4. Irrelevant response
5. Misreading (presentation was visual)
6. Failure of response
7. Surrogate response (*Komplexvertreter*)
8. Embarrassment
9. Conscious emotion
10. Response content
11. Postcritical delay

This list is particularly interesting because of its inclusion of " conscious emotion " in the status of a complex-sign, with the consequent assignment of a very important rôle to emotional processes operating at an unconscious level. Aside from the strength or weakness of this hypothesis as such, its relation to the matter of complex-signs can be submitted to a more objective test than has been reported. There arise such questions as these: In their traceability to complexes, how do responses without complex-signs compare with those that show them? Do overt complex-signs occur together without conscious emotion more frequently than they do with it? To what extent are other than " complex " factors included in the interpretation of overt complex-signs? At present the whole matter of unconscious complexes appears outside the scope of psychometrics and is based on a type of evidence different from that accepted within its sphere.

Hull and Lugoff (106) have investigated the scientific status of complex-signs by statistical means. They used Jung's list and studied a group of nine " signs." They found continuity in the number of signs elicited by the different

words in the list, though those eliciting the most were of clearly more emotional tone than those eliciting the fewest. Their study is unusual, in recording no difference in men and women in the totality of complex-signs, though it exists for particular ones. The natural point of attack is to observe the extent of correlation between the reputed "signs." Upon this basis they argue positive value, in order given, to repetition of stimulus, assimilation (misunderstanding) of stimulus word, long reaction time, failure of reproduction. Less than the customary stress is laid on the importance of plurality of complex-signs over a single one. It is regrettable that no correlation with introspection of emotional reaction seems to have been attempted under conditions that must have been especially favorable for such observations. The relative correspondence of introspective ratings and complex-signs, and complex-signs with other complex-signs, as has been observed, has an important bearing on the question of "unconscious" complexes (107, 35; 94, 180).

Following the work of Hull and Lugoff (106), Hubbard (100) made a study of the relation of complex-signs to the part of the series in which the response to a given stimulus word occurs. The following were considered as complex-signs: failure of response, failure of reproduction, irrelevant responses, repetition of stimulus word, laughing and smiling, incidental talking, "long" reaction times (though the author's criterion of long — over thirteen fifths, also used by Hull and Lugoff — is open to question). A natural supposition might be that as the experiment progresses, the subject will become better adapted and thus less likely to become stirred by stimulus words. Such an effect will produce fewer evidences of complexes later in the series. This is almost certainly the case in long-continued practice. Hubbard found also that laughter becomes less than half as frequent at the end of the series as at the beginning. Laughter, she com-

ments, is thus much more important as a complex-sign near the end of a series. Reproduction was not so good at the beginning; failures became fewer. Hubbard comments that this is a matter of memory by position rather than of relation to complexes. Frequency (as specially computed) and reaction time were not consistently affected.

A special attempt to apply the method was based on the theory that a complex might be expected to form about the consciousness of having done a wrong action. The complex-signs might thus be utilized for the determination of guilt. Actually, the positive results seem to have come mainly through the subject's being so emotionally upset as to betray himself. Since the comprehensive review of Rittershaus (108) and its generally negative conclusions, experiments in this field have tended rather away from the association test and toward the organic processes and especially blood pressure (Marston, Larson).

There are two aspects of the question: the general degree of emotional reaction to the experiment and the presence or absence of particular complexes. The latter phase belongs to the psychoanalytic work and cannot well be approached by psychometric methods. Criteria for the former are: (1) the individuality of reaction; (2) the content of the responses, with special reference to those of emotional and egocentric content; and (3) the remaining overt behavior, including the reputed complex-signs. A blank for readily recording these is described by Hubbard (100). In the writer's laboratory an ordinary blank has been utilized, with conventional signs for the more striking incidental reactions, as follows (cf. 17, 99; 106, 114):

c	Desires to change response word
f	Fidgets
i	Interjections not intended as response words
l	Laughs
m	Failure to understand stimulus word
r	Repeats stimulus word
s	Speaks phrases or sentences which may contain response word
w	Gives more than one response word
x-300	No response produced within one minute
?	Asks questions about stimulus or response

The most practically serviceable of the above three criteria is the individuality of reaction as determined through the Kent-Rosanoff word list.

Routine of giving. For discussion of routine procedure in the test, reference may be had to Kent and Rosanoff (97, 6), to Hull and Lugoff (106), and to Hubbard (100). The room should be as free as possible from distracting influences, especially sounds. The subject should be comfortably seated. He should, of course, not be able to read the record, nor should the examiner look at his face. Kent and Rosanoff take care of these conditions by having the subject sit with his back to the examiner. Instructions used by the writer are substantially:

Now I am going to repeat to you a list of ordinary English words — words that you will know perfectly well — and each time I give you a word, answer with the first word that comes to your mind on hearing the word that I speak to you — the first word it suggests to you. For example, if I should say to you “grass,” you might say “green” or “tree” or “field” or “grows,”¹ or any word that comes up in connection with it. Do not try to hunt around for some particularly good word, but give the first thing that comes up, as quickly as you can. The important thing is to bring the answer out promptly. Now let me try one or two, and let me see whether you have the idea.

¹ Some authorities disapprove strongly of giving illustrations in this way, on the ground that it turns the response type in an artificial direction.

Stimulus words such as "apple" and "fork" make good examples. Stimulus words are spoken distinctly, in a monotone or slightly falling inflection. Some experimenters use rising inflection. Pen is better than pencil for recording. Times are noted *immediately* after the response words, in fifths. Frequencies, when recorded, are written so as to be readily distinguished as such; e.g., in colored pencil.

If a reaction word is not understood, the subject may be requested to repeat, but this often leads to reflection and a desire to change the response. The best course is perhaps to ask for the spelling of the word (particularly in the Kent-Rosanoff series). If a stimulus word is misunderstood, or a reaction of more than one word given or one which for some other reason cannot be recorded, the stimulus word may be repeated at some point later in the series or at the close.

The Kent-Rosanoff tables are based on single-word responses, and this is a condition which some subjects are constitutionally unable to meet. Despite all instructions that can be given, they will respond with phrases or sentences, even making such responses as "not long" to "short." Such records, of course, cannot be dealt with by Kent-Rosanoff standards, but have their significance of difficulty in adapting to the task.

The study of special complexes is facilitated by still further exclusion of distracting noise, by having the subject recline comfortably instead of sitting, in a somewhat darkened room and with eyes closed, and otherwise allowing the experiment to take on something of the character of a rite.

For quantitative study, the record should be scored by distributing the response times, the frequency values, and the logical categories, for which quadrille paper should be available. For the times and frequencies, central tendencies and some measure of dispersion should be computed. The median is the easiest figured from a distribution, but with an

efficient adding machine the average may be as conveniently calculated; besides which, certain important norms are now based on averages.

It is probably easiest to start the stop watch at the beginning of the stimulus word, although differences in this practice are of negligible importance. One naturally stops it when the subject begins to respond. Failures of timing, due to the subject's making some preparatory noise, clearing the throat, etc., are practically unavoidable. If many tests are made, the continual starting and stopping of the watch is very wearing on the mechanism. The writer is of the opinion that in the evaluation of association times nothing worth preserving is lost by allowing the stop-watch hand to run throughout the experiment and reading as closely as possible the time elapsing between the speaking of the stimulus word and of the response. This also avoids the failures of timing just mentioned, as well as the distracting effects of the clicks with which the ordinary stop watch operates.

Word lists. An association word list should contain only such words as the subject readily comprehends. Difficulty in this respect interferes almost by definition with the associative processes it is desired to study.

For this reason the association experiment is unsuitable for subjects with language difficulty. Further, the variety and richness of response that can be obtained is limited by the subject's command of his own language as related to his intelligence. Accordingly the word lists most used, those of Jung and of Kent and Rosanoff, will be found to consist essentially of words in quite common use. This applies more to the Kent-Rosanoff list than to Jung's. Kent and Rosanoff desired to avoid words of emotional coloring, while Jung's point of view favors giving them a more prominent place. The Kent-Rosanoff list is standardized in English; that of Jung is originally German, and there is room for some latitude

in its translation into English. Eder, who translated the *Diagnostische Assoziationsstudien*, gives an English list based on Jung's, embodying the same general point of view. Another good rendering of Jung's list is given by Whately Smith. Both of these are 100 words long, as is the Kent-Rosanoff list.

Dooley (105) had previously given a careful revision of the Jung list for English purposes, 154 words in length, also appending a classification of these words into eight groups representing their efficacy as stimulators of "complexes." Other lists are found in Jung's work, sometimes running over the usual length, but these have not been reduced to so standard a form. The significance of the Kent-Rosanoff list lies in its standardization as to response-frequency; that of the Jung list lies in its striking more directly at affective complexes of the subject. The question arose if it were not possible to combine these features and one or two lesser ones in a single list. From the writer's attempts in this direction results the list given on page 215.

This list contains 61 words from the Kent-Rosanoff list, which are sufficient to give a practical criterion as to the subject's tendency to common or individual responses. It also contains 23 words of the Jung type, these being chosen from among those generally likely to have emotional coloring. The four words *tooth*, *fun*, *soak*, and *skirt* are, so to speak, "wild," intended to be replaced by any words especially suitable in the given case. Among the Kent-Rosanoff words are also 16 words selected for their relative availability for the "opposites" test. It is sometimes useful to include an opposites test with one of free association as part of the same experiment. A fourth group of stimulus words embodies a feature to which attention has been directed especially by Oberndorf — the possibility of being accepted in one of two or more meanings; cf. such words as *bear*

BOSTON PSYCHOPATHIC HOSPITAL
PSYCHOLOGICAL LABORATORY

SERIES 10

FREE ASSOCIATION

House

Name.....Birth-date.....Date.....Time.....O.P.D.
Foreign Lang. Difficulty; None; some; marked. School grade.....
.....at.....Yrs.
Willingness.....Effort.....Physical Activity.....Speech.....
Examiner.....

Table.....	Wish.....	+Monkey.....	THREATEN.....
Dark.....	?Tooth.....	?Soak.....	Hammer.....
Music.....	<i>White</i>	Dream.....	+Stiff.....
+Fine.....	Beautiful.....	Yellow.....	PITY.....
<i>Man</i>	Window.....	+Bear.....	+Strike.....
FALSE.....	Rough.....	WILD.....	+Crab.....
<i>Soft</i>	STINK.....	<i>Boy</i>	DESPISE.....
+Ball.....	Foot.....	<i>Light</i>	<i>Loud</i>
Mountain.....	Spider.....	Health.....	+Push.....
House.....	Needle.....	Bible.....	LUCK.....
<i>Black</i>	ANGEL.....	DANCE.....	Joy.....
KISS.....	Sleep.....	Sheep.....	Bed.....
Comfort.....	Anger.....	Bath.....	Heavy.....
Hand.....	OLD.....	PROUD.....	Ox.....
<i>Short</i>	<i>Girl</i>	<i>Swift</i>	Baby.....
BURN.....	<i>High</i>	Blue.....	STORK.....
Box.....	+Steel.....	Hungry.....	Scissors.....
<i>Smooth</i>	Sour.....	Priest.....	Quiet.....
Command.....	?Fun.....	+Pool.....	Green.....
PRICK.....	Trouble.....	Head.....	?Skirt.....
Sweet.....	+Grace.....	+Root.....	+Pull.....
FROG.....	Cabbage.....	<i>Long</i>	UNJUST.....
Woman.....	<i>Hard</i>	SWIM.....	DEAR.....
<i>Cold</i>	ASK.....	Whiskey.....	Blossom.....
<i>Slow</i>	Stomach.....	Child.....	Afraid.....

NOTE. Kent-Rosanoff words are in ordinary type; Jung words are in capitals; "double-barreled" words follow a plus sign; extra words follow a question mark; opposites words (also in the Kent-Rosanoff list) are italicized.

or *spring* ("double-barreled"). A criterion is obtained as to which of the meanings is uppermost in the subject's mind. It is of course necessary to observe in such instances any evidence of the suppression of an embarrassing meaning in favor of an indifferent one (complex-signs).

While the usual length of a series is 100 words, many salient features of the experiment may be shown in series of half this length. Occasionally there are fluctuations of response type that make the longer experiment desirable. It may be desired to continue the observation beyond a single standard experiment. Several studies have been made of the effects of repetition of the original word list (103), or a series of as many as a thousand words may be given, say in groups of fifty on different days. Suitable lists for such purposes are available. Dooley's observations continued over a period of months, embodying very full studies of a word list of ordinary length.

Where the question of frequency enters, words from the Kent-Rosanoff list must be used, as they are the only ones for which frequency norms are available. Blanks for the list can be purchased, or made on the duplicating machine. An economical procedure is to note the stimulus word by number on the record sheet used. Freyd utilized the first 25 words only for a frequency score. For individual study, the examiner will not hesitate to insert or substitute such special stimulus words in a more standard series as he may deem expedient.

Association types and secondary factors affecting them. Jung and Riklin gave in their early work a characterization of association types which subsequent experience offers little to modify. The translation may be quoted (88, 132) :

Through our experiments two well-characterized types emerge: (1) a type in whom the reaction makes use of subjective experience often emotionally charged; (2) a type who shows in the reaction the

objective habit of mind. The first type is characterized by the occurrence of pictures of personal memories which are often markedly emotional. The latter type preferably relates words to words or concepts to concepts, the personal element playing quite a subordinate rôle in the reaction. This may be termed the objective type.

The main reservations to be made are (1) that the modes of reactions are not types in the sense of species, because there is an entire continuity between them, and (2) that the subgroups into which the "subjective" group is subsequently divided are hardly so clear and distinct as to make it profitable to preserve them.

As the significance of Binet test findings depends on the constancy of the IQ, so the use of the association experiment in personality "diagnosis" depends on its reliability in showing similar results in successive trials. Fuerst (88, 414) calls this whole hypothesis into question, especially with reference to the effect of different experimenters. This latter aspect of the matter has been touched on by other writers but is very difficult to study adequately. A working degree of constancy of type with the same experimenter is tacitly assumed with nearly all work with the test and has been measured in one study especially directed at this point (109). Fuerst's whole work on familial agreement in associative tendencies is broad-based on the hypothesis of characteristic types. Otherwise no meaning attaches to the findings reported for brothers and sisters (88, 444) or the change reported in women about the fortieth year (88, 441) and in men about twenty years later.

Jung's experiment on the association type as affected by distraction showed a tendency of distraction to "flatten" the associations; i.e., make them more superficial. This effect has already been mentioned with reference to its bearing on the technique of the test. As Jung and Riklin formu-

lated the matter, the degree of this distraction effect is a criterion of the degree to which the subject is able to divide his attention. The effect of distraction is, as Jung notes, similar to that of schooling. It is slighter in women than in men. That is, under distraction women adhere more closely to their normal response type; "the female attention has proved itself less easily dissociative toward our experiment" (88, 157). The discussion is somewhat obscured here as elsewhere by the concept of "inner" and "outer" associations, the former of which categories mixes the predicates and important objective categories together. Apparently the predicates are especially resistant to distraction effects (88, 149).

While the association experiment is of relatively small importance as a measure of intelligence, differences of intellectual development do show themselves in the general reaction thereto. Education, with the greater facility in manipulating language concepts that it confers, is found by Jung to increase the objectivity with which the experiment is approached. The uneducated tend to regard the stimulus in more the light of a question. In a sense it is always so; each stimulus word is preceded by "what about" understood. But those linguistically less apt are more closely tied to the stimulus word. Jung finds that the responses depart less from it in respect to grammatical form or number of syllables. In the writer's experience subjects often alluded to the difficulty of finding "answers" to the stimulus word (independently of the occurrence of this word in the instructions) or took the attitude that a "definition" is required (88, 131).

Linguistic aptitude can thus affect the association type in two rather opposed ways. From the above point of view, it tends to "flatten" the responses, make them more superficial (88, 232). On the other hand, it greatly increases the rich-

ness of the response material through which subjective reaction, if present, can be expressed.¹ Hence the effects observed by Kent and Rosanoff. In mass observations the two tendencies probably neutralize each other (cf. page 203). Jung's comments on the whole matter are critical and worth careful study (88, 128 ff.). (Jung's use of "egocentric" is different from that used here.)

The opposites test as an adjunct. Comment has already been made on the relation of the opposites test to that of free association. The relation of the reaction times in the two processes is of sufficient interest to justify making such a test as a routine procedure immediately after completing the free association test. The Kent-Rosanoff list contains many words suitable for this purpose, of which the following 21 were selected by the writer for special observation:

black	high	rough
boy	joy	short
cold	light	smooth
dark	long	soft
girl	loud	sour
hard	man	swift
heavy	quiet	white

Under the ordinary conditions of the free association test, the margin of error in timing is not far from 200 sigma, but the errors are compensating as far as concerns the relation of free and opposites times, which is the point of consideration. This is conveniently expressed in the form of a ratio — the per cent which the "free" time is of the "opposites" time.

¹ Jung recognizes this effect in the following: "The uneducated has about one-half fewer egocentric reactions than the educated. This suggests that he lets himself go much less and allows fewer disguised subjective wishes and valuations to break through. He strives after the utmost objective apprehension of the stimulus word" (88, 130). On the preceding page, "The educated show a distinctly shallower type than the uneducated."

In a mixed group of 71 psychotic cases these ratios were widely distributed, ranging from .62 to 5.08 without marked central tendency; median approximating 1.75. One other case observed could adapt to the opposites test but not to the free association experiment; another could adapt to the free association experiment but not to the opposites test. In a group of manic-depressive cases (42 from material below cited) the most distinctive finding was an apparent raising of the ratio in the depressed cases, essentially in the women, in whom the median ratio was 2.3 — the free time being thus more than twice as long as the opposites time.

The test as influenced by affective psychosis. There is available a series of data on the test with a group of manic-depressive cases, 18 under the diagnosis of excitement, 49 under that of depression. The group are above average in social status, though their Stanford IQ average is just the normal, this average being probably reduced by the psychosis. In the excited group there are 9 men and 9 women; in the depressed group, 26 men and 23 women. The age distribution is as follows:

	10-19	20-29	30-39	40-49	50-59	60-69	70-80
Excitements, Men .	0	4	2	0	2	1	0
Excitements, Women	0	3	2	1	2	1	0
Depressions, Men .	1	2	4	7	6	4	2
Depressions, Women	1	8	4	1	3	6	0

In respect to association time, both excited and depressed phases show some lengthening over the normal average — the score for the excited being 12.5; for the depressed, 15.7 (median in fifths). In respect to frequencies, there is no difference between excitements and depressions, but the frequency scores are reduced to about half the normal average. In each case the women show lower scores, the differ-

ence being greater in the depressions (3.5:5.5) than in the excitements (4.5:5.7).

In logical categories the "subjective" (i.e., No. 1) seems below normal average in the excitements (score, 17) and above it in the depressions (score, 29). In each phase women show over half again as many of these as the men, but less, if anything, than the normal difference observed by the writer. The supra-ordinates (No. 2) are apparently reduced in number, especially in the excitements. In both the depression and the normal data available the men show more of them than the women (this difference does not affect the small group of excitements). In the excitements the contrasts (No. 3) are about normal, but are reduced to one-third normal in the depressions. No sex differences appear in the normal material or here. The miscellaneous category is also reduced — more in the depressions than in the excitements, most of all in the depressed women.

The small speech-habit category is also reduced to about half its normal size, and it seems worthy of note that no difference between the depressed and excited phases is shown. The most general result is the reduction of the other categories in favor of No. 1, which is consistent with the apparent psychology of the condition itself. It is the reverse of a distraction effect or flattening; rather an "introjection" (110) of the experiment, to borrow a psychoanalytic term, investing it with affective values derived through the general psychosis.

Murphy (111) reports extensive comparisons of manic-depressive and dementia præcox (schizophrenic) cases, the question being if additional diagnostic criteria might be available. A modified scheme of classification by logical categories was adapted for the purpose. Early indications were favorable, but the material as a whole was not felt to disclose any basic difference in reaction tendency serviceable in this

respect. The problem is complicated by the psychopathology of the two conditions, which do not now appear so discrete as in their original formulation. The usefulness of the method in studying cases of the disorders depends on a more general knowledge of the psychology of the experiment and of the psychoses than is pertinent to this volume. Mateer (17, 185) rightly stressed the qualitative aspect of the test, which, however, requires experience to evaluate. The references to this aspect of the matter should be studied, especially the work of Birnbaum (112).

Normal applications. In connection with Terman's work on genius, Wyman (159, 483) organized a free association method for the diagnosis of varying types of interest. Categories of interest were formulated as "intellectual," "social," and "activity." The method was found reliable in the sense of furnishing a stable measure for each individual. As a valid criterion of these interests, it was not quite so satisfactory, its applicability being essentially to groups, whereas the chief practical problems are individual ones. It is striking that individual interests show marked growth with age consistently with the growth of intelligence, while social and activity interests change, respectively, little and not at all.

A lead which has not had the attention which it deserves is opened in the study of Haggerty and Kempf (112 a), in the use of various controlled association tests. Using tests of many types, they found sex differences more prominent in those making greater demands on "choice" in the responses. The choice of a response, where choices are open, is interfered with among the women observed, to a much greater extent than among the men. This is in accord with observations of free association, which offer the widest choice of all. In some ways, however, a controlled association, such as a subject-object relation, may be better suited to demonstrate emotional inhibition than the free form of the test. With

suitably arranged material (i.e., adjusted to the subject's intelligence level), intellectual difficulties should be less likely to occur in controlled association tests, and the episodes of confusion that do occur should be more clearly referable to affective sources.

From a broad point of view, the psychometric significance of the free association experiment is that it presents a standard situation to which the response is as variable as language itself; and the extent of such variation is at the same time measurable. As a criterion of the conformity of thought processes, the test is in a class by itself and owes this position particularly to the work of Kent and Rosanoff. In considering the use to be made of this fact, it is necessary to consider certain psychological concepts particularly due to Jung, though he appears not to have concerned himself with them in relation to association experiment.

There have been, however, few so stimulating concepts in personality study as those represented by the extraversion and introversion of Jung (113) or the syntonie and schizoid of Bleuler. It is not yet clear in just what ways these terms will be most serviceable (114 and 115), but in general one may regard the former term as representing a harmony with the environment, active or passive; the other, a disharmony that may express itself in a striving with the environment well or ill adapted, or a shut-in withdrawal. These tendencies are so important from the standpoint of social adaptation as to lend special interest to any psychological method which throws light on them. Experimental psychology is today attacking this problem from many angles, and several promising lines of approach have been discovered, though the free association experiment is the only one which can as yet claim rank as a psychometric method. The theoretical basis is simple; namely, that a person who, under great possibilities of variation, reacts in the association experiment as others

do, will find himself in better tune with social situations generally than the person whose reactions tend to be peculiar to himself.

There are a few comparable data from the point of view of salesmanship; theoretically the results should be similar. Freyd utilized the Kent-Rosanoff list and tables in comparing industrial students with successful life-insurance salesmen, but with great modifications of technique (e.g., written responses). Results quoted (51, 32, 35) are all in the expected direction, but probably smaller than would have been shown by the experiment in its original form.

REVIEW QUESTIONS AND EXERCISES

1. Define the relation of the free association experiment to the most nearly related methods.
2. What are the main lines along which the test has been evaluated?
3. Discuss whether the chronoscope is preferable to the stop watch in the timing of an association test.
4. Discuss the finding that the free association time tends to be longer in women than in men.
5. Discuss Jung's "predicate" association type.
6. Describe the construction and use of the Kent-Rosanoff frequency tables.
7. What are "non-specific" reactions?
8. Discuss the status of complex-signs as objective criteria of emotional response.
9. Name at least three features which have been commonly regarded as complex-signs.
10. Outline a plan, of the scope of a doctor's thesis, for investigating further the question of association types.
11. What is meant by "distraction effect" in an association experiment?
12. What is the relation between association type and "intelligence" in the Binet sense?
13. How does the "opposites" test behave in comparison with that of free association?

14. Discuss the experiment as related to the concepts of introversion and extraversion.

15. If a suitable subject is available, the instructor may give a test as a demonstration of technique, emphasizing that responses so obtained are not comparable with those made under regular conditions.

16. A record of some intrinsic interest should be reviewed with the class from the point of view of evaluation.

17. A class experiment with written responses may be made, the students evaluating their own records (not for inspection).

18. Projection apparatus may be used to visualize special points, such as examples of the logical categories.

Special References for Chapter IX in Addition to Those Cited
in the Text

BLEULER, E. "Die Probleme der Schizoidie und der Syntonie." *Zeitschrift für die gesamte Neurologie und Psychiatrie*, Vol. 78 (1923), pages 373-399.

STUMBERG, D. "A Comparison of Sophisticated and Naïve Subjects by the Association-Reaction Method." *American Journal of Psychology*, Vol. 36 (1925), pages 88-95.

CLINICAL MATERIAL

Case XLII. A man of 26, second of seven children; no psychopathic heredity. Normal educational history, reaching high school at 15, when he left rather suddenly because he was "tired of it." Worked in a clerical position, being fairly efficient; military service, during which he had a speech difficulty whose organic or functional origin is uncertain. Since discharge has been economically less efficient. Always interested in sports and took some part in them; out with other men a good deal; very shy toward opposite sex. It is complained that recently he had accosted girls in the street and sometimes kissed them. If they resisted, he would be frightened and leave the scene immediately. At first these episodes were compulsive; later, with some preconsideration. He was arrested and referred by the court for opinion.

Stanford examination yielded an IQ of 98, rather above average, with little scatter. He was given the association word list cited on page 215. He responded in a fairly normal manner until the twelfth stimulus word, which happens to be "kiss." It took 14 seconds to elicit to this the response word "a" (no previous response was over 3 seconds). The reverberations of this episode apparently continued throughout the record. The frequency scores average 8.3, which is low. There is also evidence of other disturbance of the thought processes in the long times, thirty-five of which are over 5 seconds, coupled with opposite times, only two of which score over 1 second. There are many "non-specific" reactions. The record is a legitimate reflection of the abnormal process indicated in the history.

Psychometrically he was regarded as possibly in an early stage of a more serious disorder; a suspended sentence, with extended hospital care, was recommended. The former was given, but the patient was referred for out-patient treatment only. This was discontinued after about 10 months. The above complaints have ceased, but at last accounts the patient was under a more serious charge of an allied nature.

Case XLIII. A man of 35; never knew parents; reared by uncle in very straitened circumstances. Finished grammar school at 15 years and has studied along mechanical lines since, but always had to work. Economic history discloses moderate efficiency; highest pay \$1500 a year. Apparently would leave jobs because of

discontent, independently of prospects of getting something better. Finally was unable to get work. Arrested for vagrancy and referred by court.

A Stanford scale was normal as to willingness, but scattered considerably over six year levels; showed marked fluctuations of effort. His use of language was relatively good, and there was some *bizarre-rie* of response; the record points to some deterioration or other anomaly even in the presence of an IQ of 92. He was given the association word list cited on page 215. The median time is 3.0 seconds, which, with an IQ of 92 and a median for opposites association of 1.2 seconds, is unexpectedly long. The frequency median is .63, lower than the writer has ever observed in a normal person. Nearly one third of the Kent-Rosanoff responses are "individual," in accordance with which they show more than ordinary subjectivity of content, illustrations being:

dark-fear	man-virility
burn-distress	high-frightful
dream-laziness	priest-catholicity
head-physiognomy	whisky-discouragement
push-unmannerly	stork-visitor

The picture shown above, in the presence of mental clearness and easy acceptance of the hospital situation, points in the direction of schizophrenia; this was psychiatrically diagnosed, and institutional care was recommended. This was apparently not supplied at once, and he was shortly brought to the Hospital again, but after a week was discharged to relatives. In about another month he was again brought by the police, for attracting a crowd on the street by peculiar actions. In Hospital he was bland and coöperative so far as his general apathy permitted. He was committed to another institution, under the diagnosis of dementia præcox.

Case XLIV. A girl of 20; reared by uncle's family. Did fair work through high school, reached third year at 19; has done clerical work since. Complaint is of fainting spells and slackness in work and other personality difficulties.

The psychometric tests generally reflected a disturbance of intellectual processes by over-intense affective reactions. She did not have a Stanford series. Performance tests were low average. She

seemed to understand the tasks readily but became mentally blocked and confused. Her hand trembled with apparent excitement. Certain of the Kuhlmann tests were tried, the response to which is interesting in relation to her educational status. In an initial trial with the arithmetic test, she confused altogether the meaning of the signs: thus, 25 plus 2 is 50; 31 minus 3 is 63; 23 times 4 is 92; 85 divided by 5 is 180; 17 plus 6 is 102. The quarters and hard directions tests she accomplished at about the 12-year level. There were twenty errors in the unfamiliar forms test. Generally the work gives the appearance of gross carelessness, but it is better understood as her easy emotional upsetting. She told the examiner that when she came in she had resolved not to get rattled, but this is exactly what she had done. The association test is interesting as the reverse of individualized response that might be expected. The median frequency score is 16.6, which is quite high. On the other hand, there was considerable fidgeting, some uneasy laughter, and the opposites responses were very short.

Almost the only bright spot in the psychometric record is the frequency score of the association test, but this seems to have represented a real asset on the patient's part. Katamnesis describes her subsequent social adjustment as extremely satisfactory; appears to be well liked socially and in a business way, and is making progress in both directions. The difficulty seems to have been of an episodic nature.

Case XLV. A boy of 19, second of five children; some evidence of neurotic traits in both parents; is rather precocious intellectually, but was dropped from high school for indifference. There is no single outstanding complaint, but a general maladjustment is manifested in employment difficulties, petty dishonesties at home, carelessness of the person, over-development of fancy life.

In a Kuhlmann Supplementary Series he made a superior adult score, his only failures being syllogisms, triangle-on-square, and unfamiliar forms in year 12. These failures betoken a weakness in visual memory that appears elsewhere. A series of reaction-time measures (as with Case XLI) were all of average lengths, the sums and sentences especially long (2 seconds), but there was only one false reaction in the whole series, which is unusual. His over-active ideational life lent interest to his work in tests of the performance type. Contrary to what might have been expected, he scored above

average on the hard Stenquist. In formboard and dexterity tests he is slow, shows little resource or imagination in attacking them, apparently lacking urge to do well. Healy PC-II yielded only a 9-year score, that being again failure to criticize the inferior placements.

The chief psychometric anomaly appears in the association test. His score for individuality of responses is .8, the normal average being about 9.0. His reaction times were also longer than average — 16.6 as compared to 10.0. He had a defense word “useful” which he repeated a number of times. There were some rather recondite associations, such as :

mountain-Himalaya	black-Beauty
burn-Rome	frog-reptile
cabbage-Wiggs	bath-Caracalla
swift-John	head-Medusa

It was felt that the patient was fundamentally deficient in vital energy, which made it impossible for him to get his satisfactions along the usual lines and made him seek them in more facile spheres of intellectual activity. To some extent he appeared to feel this as a deficiency, and to have reared a defensive philosophy for his reaction type. The main problem in dealing with such a case is to arouse an interest (elicit an output of energy) sufficient to do his work well. For the immediate situation a regulated environment under stimulating conditions, such as a boarding school of good caliber, was recommended as the plan best suited for him. The facies carried a suggestion of endocrinopathy.

Educational progress along the above lines was actually attempted, but while he adjusted reasonably well to the immediate environment, he did not continue in it, nor does he seem to have especially benefited from it. Subsequently he made various unsuccessful efforts to obtain work, in the course of which he was given some tests for special industrial capacities. The scores were uniformly low, none being up to average. One of them, the “observation” test, involving visual memory, yielded the lowest score yet observed. He evinced no aptitude for industrial or office work. Vocational adjustment will be difficult, and that work which he is able to do will probably be too simple for his intelligence to be contented in. The other children of the family are making satisfactory adjustments.

Case XLVI. A girl of 19, with a rather high-strung family background; third year high school at 17. Various attempts at employment unsuccessful. The patient has reacted violently to home tensions which restrict her in the active social life she wishes. This maladjustment became so acute that a friend induced her to take up the matter with the Hospital.

Psychometrically she made intense effort, but she appeared very affected, fidgeting, laughing, and exclaiming on slight occasion throughout the interview. In a Kuhlmann Supplementary Series she made an average adult score, rather scattered; she failed the cross-line and arithmetic tests and did excellently with the opposites, the unfamiliar forms, the hard directions, and the quarters. These were all tests she could do without prolonged effort. The performance thus shows marked variability among the intellectual functions. The reaction to the association experiment was in keeping with the remainder of the picture. The association times are somewhat longer than average, while the opposites times are unusually quick, the difficulty being one of slow associative processes. The frequency score is also low. There was a trend in the responses indicating mental processes of a rather naïve level, such as :

box-candy	sweet-candy
woman-clothes	girl-dress
long-snakes	

Two words elicited no reaction other than fidgeting, laughing, and such expressions as "I couldn't see anything to think of." "What would you think of?" "I don't know." These words were "wish" and "boy."

The various personalities entering into this situation put different constructions upon it, from which it is hazardous to estimate the real state of affairs. The patient actually steadied down much more readily than would have been anticipated from the accounts at hand. Work was found that suited the artistic trends in her make-up, to which she has adjusted satisfactorily for many months. The family attribute much of the acute difficulty to the influence of an older girl friend who was radical and over-emotional and who later developed a psychosis. Patient has now formed much healthier attachments and is apparently making a quite satisfactory general adjustment. While the case is clinically diagnosed as psychoneurosis, the katam-

nesis would bear this out only in a very mild sense. She appears to have been a girl who stretched some particular mental habits to the danger point, but was able to realize that she had done this and reorganized her life on a more stable basis. The main rôle of the Hospital was probably that of bringing these considerations before her with due emphasis.

CHAPTER TEN

VOCATIONAL PROBLEMS

Ability and incentive — General application of tests — Specialized tests — Vocational guidance and the total adjustment

Ability and incentive. The question of vocational guidance necessarily enters from time to time into the problems of clinical psychometrics. The purpose of this chapter is to discuss in a general way the relation between vocational adjustment and psychometric method. The part which these play in vocational guidance is the determination of what occupational assets the individual has to dispose of. The present discussion is not concerned with those aspects of vocational guidance termed "informational," such as the market for different types of service, their material returns, and miscellaneous advantages and limitations attaching to various occupations as such. The problem of vocational adjustment is to place one in the work through which he will get the highest legitimate satisfactions. To enable one to "function at his highest level" is a convenient formulation derived from Seashore, based on the hypothesis that one will get his greatest satisfactions from so functioning. From the present point of view it is elementary, almost tautological, to say that satisfactions lie in doing things one wants to do — in less crude diction, is "interested" in doing or has incentive for doing. As an element in satisfaction, ability is secondary to interest or drive.

Nearly all tests are measures of ability. The value of tests in dealing with the above problem is thus mainly dependent on the extent to which interest and ability run parallel. For practical purposes this parallelism is largely assumed, and when we find a person doing well in certain tests, there may be similarly assumed sufficient interest for the function they

denote to promise vocational satisfaction therein. An easy acceptance of abilities as criteria of interest has been combated from the psychoanalytic point of view (cf. also White, 116). But the reliance upon test results alone, unchecked by the study of interest trends and informational data, is so patently unwise that it is difficult to imagine it being done by any one seriously concerned with vocational questions.

If a person has a paramount interest in a certain vocation, he is perhaps just one degree more likely to weigh his fitness for it than a person in love is to consider the wisdom of his heart. Hence it comes about that in adults the most serious vocational problems that come to present attention are not questions of abilities, but of interests. It appears that a great many persons — no one can say how many — reach the age of self-support with a marked lack of conscious vocational bent. There are two possibilities in such a case. Careful personality study, not unmixed with a psychoanalytic point of view, may open up certain avenues of interest of which one has been of himself unaware. This is the more fundamental approach to the situation, but is rarely practicable. A less profound but more practicable and also more objective procedure is to experiment with such psychometric methods as are available, with a view to ascertaining some ability about which sufficient interest may be cultivated to make it a reasonable source of satisfaction.

General application of tests. Theoretically, it should be possible through "job analysis" to determine elementary abilities necessary for a given occupation, to measure these by means of tests appropriately constructed therefor, and to judge the fitness of a candidate accordingly. Conversely, by making a test survey of his abilities, suitably analyzed, one should be able to direct him to occupations where the special abilities disclosed, if any, will be useful and his disabilities the least handicap. The experience of the Judge Baker

Foundation is that very useful guidance can be given in this way, at least from the standpoint of education. If such analyses are time-consuming, they can also be well worth the time they take. The limitation is that they are less objective, and their usefulness depends much on the ingenuity and intellectual opportunism of the examiner. Their discussion belongs to more specialized treatments than the present. Those by Bronner (117) and the Hollingworths (118 and 119) should be scrutinized; also the case studies of the Judge Baker Foundation (120). This conception of the problem has been relatively important in Germany (cf. 115 a, 244), where there has been vigorous reaction to the general topic, with a mass of experimental work.

A measurable balance of probability is what can be expected of the vocational test in its present development. A test which was perfect as a test would be no infallible guide, for the result is modified by many factors, other than specific professional ability, that enter into success. The test should be so standardized, however, that the probabilities of success with given scores can be stated in some numerical terms (115 a, 117). These should not be more refined than the development of the test warrants.¹

The place of the general intelligence test in vocational guidance is to denote the level of accomplishment which one is likely to sustain within a given field, the field of choice itself being determined by the more specialized tests. Consider the hierarchy of clerical work, from addressing envelopes to higher accounting. In a test of potential ability for clerical work, adult experts in these two tasks might well have similar scores, but not so in the intelligence tests. On the other hand, the highly expert accountant and the engineer should have the same order of intelligence scores, but may differ

¹ "For all practical purposes, IQ's differing from each other by not more than 5 points are equal" (119, 93).

very greatly in response to tests concerning their respective professions. A person familiar with mental measurement is not likely to make vocational suggestions without knowing the intelligence score, but it should be utilized as above and in the light of accessible information about the scores appropriate to different occupational groups. (Cf. 49, 198-199; 119, 194.) Otis (121) has pointed out disadvantageous features in a too high intelligence score. In dealing with adults, the group tests may offer better material than those of the Binet type, especially under individual administration (cf. page 112).

Specialized tests. The most efficient means for developing vocational tests is through the interest of an industrial organization in improving its employment service. It will endeavor to find tests to select those who will do well in its various occupations. To this end it will try out various tests with the present personnel and correlate them with their actual performance; it will also try them with new applicants and observe how they check up with subsequent performance. A small proportion of the tests tried will survive as having sufficient predictive value for the jobs concerned. The test offers a basis for predicting that the person will do well in a certain occupation, which fact is significant for the man as well as for the company; for guidance as well as for selection. It is, however, impossible to say that the best vocation is picked out in such a way, for the number of abilities so far covered by tests is limited. The practical problem is, however, generally met if some asset is discovered in the actually measurable fields.

There are certain external factors that are to be striven for in any test (122): simplicity of material, ease of scoring, etc. But to choose correctly the task to be measured is so difficult that one is wise not to attempt it. Experts in mental measurement never tire of assuring us that it is impossible to

predict what the outcome of some change in a standard test routine will be. It is at least as difficult to predict what the meaning of any test will be until it has the experience of standardization behind it. No doubt there are common-sense distinctions between a test for comptometer operators and one for machine inspectors, but the field of trial and error is still very large.

Nor can it be told in advance how complicated a test or how many tests will afford the most efficient prediction of vocational aptitudes. Against the possibly greater accuracy of a "battery" or "team" of tests must be balanced the greater cost of their administration. Research is often conducted from the point of view of discovering whether or not the applicant has a certain aptitude. This is the method natural to specialized industry. Burt's (123) work on tire making is an early case in point. It exemplifies, as does the work of Bills on clerical aptitudes (124), the use of a "battery" of tests, each of which makes a varying contribution to the measure described. In organizations calling for skills of very different types, the effort is more likely to be concentrated on getting the best predicting single test for the occupations dealt with. An individual may then take a number of tests, each directed at some specific industrial occupation or class of occupations, with regard to the place in the organization for which he will be best fitted, presuming he meets the standards at some point. Or a person already in the organization may take the tests in relation to the question of his proper placement there. An important accession to our knowledge from this angle is the contribution of O'Connor, of the General Electric Company, and it is a procedure within the time and resources of the well-equipped psychological clinic.

Among other American researches which may be utilized in vocational psychometrics are those of Paterson on filing (125); Burt and Ives on agricultural engineering (126);

Thurstone on telegraphy (127), engineering, typewriting, and general clerical work; Tuttle on typing (128); Bills on stenographers and comptometer operators (129); Yoakum on life-insurance salesmanship (130); Bregman on retail salesmanship (131); and Cowdery on professional interests. The later form of the Stenquist tests (mechanical aptitude) (132) should be serviceable where relevant. The tests of musical ability developed by Seashore (cf. 133) are especially important, and a distinct accession to the measures of mechanical ability has been offered by MacQuarrie.

Psychometric methods arising in this way are mainly developed with adult industrial workers. The problems of a clinic will also include juveniles. It is probable that above the age of 14 years most tests can be evaluated in terms of adult norms without gross error. Below this age increasing reliance must be placed on general tests of intelligence or "performance." Poull has developed but not published a combination of the Seguin form board and Kelley construction tests, which checks well with the success in shop work of institutional children. A test of manual dexterity, the variety of whose tasks was thought to adapt it better to juveniles than the repetitive tests of Kemble (133 a) and of O'Connor (96), has been published by Whitman (134). A general difficulty with these tests is to know the "critical" score (Thurstone) above which special ability may be recognized. The upper quartile may be taken as a working basis corresponding roughly to the A and B limits in the Army Alpha and to satisfactory industrial practice. The standards for the original Stenquist scale were apparently much more rigid (49, 129). The "validation" of tests for industrial aptitudes is a complicated matter; many factors enter into it that cannot be mentioned in the present setting and for which the reader must refer to the special and rapidly growing literature of industrial psychometrics.

Vocational guidance and the total adjustment. Where special abilities are not present and special interests cannot be elicited, the vocational problem is similar to that of happy marriage for the impotent. But just as persons may lead a very tolerable existence whose marital situation is far from ideal, so is the question raised of the rôle which vocational adjustment may be expected to play in the satisfactions of the personality as a whole. It is not axiomatic that one get essential satisfaction from his work any more than from social activity or the domestic circle (135). A good general adaptation may exist with meager economic resources. There seems actually to be a definite lessening reliance on vocational activity for life's satisfactions. Men dream of three- or four-hour working days. That is not the Utopia of energetic spirits, and the well-recognized meaning of such visions is that vocational satisfactions are in a phase of decline. The value of the craft to the craftsman is less for the craft itself and more for the automobile, radio, etc., that it affords him the means to enjoy. These latter become what the student of personality calls "balancing material."

It is no matter for surprise if the mechanization of industry has somewhat lessened the satisfaction value of the job. One must not expect the same vocational enthusiasm of the machine tender as of the gild craftsman. The compensation is that the machine tender rides in his car to a better-equipped home and to a richness of recreational opportunities which the gild craftsman never knew — and perhaps did not miss. Hence the anticipation of lessened working hours and lessened energy expended therein. In so far as this releases energy for expenditure along more acceptable channels, it should increase the value of secular existence. But under these conditions, to safeguard the disposable energy from loss or misappropriation is the most difficult application of social psychology.

Sociologically the change is an important phenomenon tending toward far-reaching consequences. Its bearing on the present topic is chiefly to shift the relative emphasis on ability and interest in the vocational choice. The worth of a vocational adjustment is, under such conditions, largely in terms of *other* satisfactions it permits. A day's work in itself burdensome may be quite acceptable as a means to domestic comfort or recreational luxuries. A thoroughly mechanized job may be acceptable as offering outlet for pleasant ruminations (Elton Mayo's *revery*) or badinage with one's companions in the task. Here the question of interest is in the background and that of ability comes to the fore. The job is no longer an end, but a means. As the entire tendency of industrialism is in this direction, it may be expected that the importance of criteria of ability will increase. One will want to know not what work will itself give him the greatest satisfaction, but what he can best cultivate as a means to other satisfactions. If it is also interesting, so much the better, but its essential function is to open the way to means of enjoyment outside itself.

The place of psychometrics in occupational guidance, while definite, is limited and on the whole less important than from the point of view of selection. Kitson's emphasis on the vocational adaptability of the human organism is a well-timed offset to discouragement of occupational interest backed by strong inclination but without psychometric sanction. Furthermore, psychometric vocational guidance may be sought by or on behalf of persons whose problems are of temperamental rather than vocational origin (115 a, 229). Vocational maladjustment through doing work for which one is "not fitted" can well function as an escape reaction from broader insufficiencies, after the psychoneurotic counsel of the elder Mr. Weller, "Never mind the character, stick to the alleybi." Vocational misplacements exist, and psychometric

methods do genuine service for some of them. But it is a serious breach of mental hygiene to allow them to serve as defenses of inadequacy; and more discretion is needed in their use than with the intelligence tests, whose relation to mental adjustment is by comparison, well understood.

REVIEW QUESTIONS AND EXERCISES

1. Why is vocational selection a scientifically more satisfactory procedure than vocational guidance?

2. A young man of 18 is sent you by his father for your opinion as to his going to college. What psychometric study would you make?

3. A girl just graduated from high school at 19 wishes your opinion of her aptitude for secretarial work. How would you proceed?

4. What is the place of intelligence tests in vocational guidance?

5. An organization employing 200 auto mechanics, with an annual turnover of 50 per cent, calls upon you to devise psychometric means for selecting applicants more advantageously. How would you proceed? What would be the relation of your work to vocational guidance?

6. Discuss the rôle of vocational adjustment in the life of the personality.

7. Specialized occupational tests should be exhibited and demonstrated as far as practicable.

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CLINICAL MATERIAL

Case XLVII. A boy of 18, one of several children; home background inferior; father alcoholic; mother deserted family. Reared in foster homes and institutions. The conditions in the earlier years relatively good. The social agency in charge desired a report on the patient's intelligence and vocational fitness, with reference to further training to be provided.

Stanford examination yielded an IQ of 97, in the presence of normal coöperation. This contraindicates college education, and he might not be able to complete high school. His ambitions lie in the direction of handwork of some kind. He speaks of jewelry and engraving. These involve accurate motor adjustments, and from the tests made in the laboratory he is not especially good in these respects. His reaction time is slow; his hands are quite unsteady; and with specific tests for accuracy of movement he is inferior. His good handwriting opens a possibility that training would overcome these difficulties. He is markedly efficient in grasping the relations of the concrete material of performance tests and reasons well about it. He expresses some interest in doing electrical work, and this would be favored by the psychometric findings above quoted, as it affords scope for his good intelligence and does not require the special precision on the motor side that jewelry or engraving would. He appeared to have sufficient interest in these directions to capitalize for vocational purposes.

The observations were made six years ago and indicate the limitations for vocational purposes of the generalized tests then available. The recommendations are what would be made now on the basis of such findings, but tests of more certain validity for the purpose in hand would be used. It is not clear that he had, subsequently, opportunity for training at the level suggested. He has, however, adjusted fairly satisfactorily at simple outdoor jobs, save as complicated by physical disabilities. His personality seems to be developing satisfactorily, and he evinces no discontent at doing a type of work that is rather below his psychometric level.

Case XLVIII. A boy of 12, second of three children; good family background, but lives in crowded neighborhood. Has been two years in the third grade and is not to be promoted. Brought for advice as to management.

Stanford examination yielded an IQ of 73, consistent with the school history, but showing some scatter, basal year being 8, and passing ball-and-field, fables, and pictures in year 12. In performance tests he made *superior adult* scores with both Healy PC tests, but was poor in Porteus mazes and Dearborn No. 3, owing to impulsivity. On the basis of these records, it was felt that there was good general ability in the presence of special difficulty in dealing with abstractions. There were also made a number of less standard tests, involving partly manual dexterity and partly mental resource in using this dexterity to best advantage. His general reaction to these problems was vigorous and fairly efficient. It was noted that while he falls down on ideational tasks in a school or test setting, he is good on topics that interest him; thus he can tell promptly what is the best play to make in given situations of a baseball game. It is a question if his intellectual difficulties are not largely of adaptation to school which could be overcome by special teaching. His occupational ambition is to be an electrician, which is well within his manual abilities, which are reasonably good for his age. The suggestion that the family procure a special teacher for him during the summer is a good one, as a competent teacher seems available, but he should not have more academic training than is necessary for him to follow a manual vocation.

He did well with the special teacher, but did very poorly on returning to the grades. His vocational training had to be postponed on account of his age, but as soon as he was able to enter such a class, he did good work with intense interest. The vocational problem appears solved for the present; the home situation continues good.

Case XLIX. A girl of 22, who has been under the care of social agencies for several years, no information being available as to the family, save that they seem to be indifferent. Normal early development; finished grammar school without repetition of grades. In 1915 had a hysterical episode requiring hospital treatment. Has worked as a domestic, but had difficulty in all places. When in response to expressed desires arrangements were made to take training as a practical nurse, she adjusted well to this. She now comes to attention more as a behavior problem and an opinion as to whether she could meet the more exacting requirements of a regular training course for nurses.

The psychometric history shows an IQ of 83 at 13½ years, of 76 at 16 years, and of 99 in the present interview. A Myers score at this time, with a mental age of 9 years, was considered unrepresentative, owing to special tension, and special questioning indicated that the previous Binet tests had been vitiated by embarrassment more than the present one helped through foreknowledge.

She reached the 3-year level in Porteus mazes, which at first were extremely difficult of comprehension. In both picture completion tests she made good scores, but without the insight that might be expected in seeing that several pictures in the second form are not equally good. There were repeated impossibilities in the moves on Dearborn No. 3, and the successes seemed largely accidental. In the test of finding the hole with the pencil point, she had practically no plan; occasionally seemed to develop a plan and then abandon it.

The Stanford record would not prohibit nurse's training, though it is probably below what a first-rate school would expect. Taking into consideration the other test records available in the more general features of the case, it appeared that the responsibility of the graduate nurse would be rather heavy for the individual. There is some question as to the permanency of the present interest, and it appeared wiser for her to continue at her present level.

She actually undertook some rather advanced business training and persisted in it for several months under close supervision, but did not complete it. She obtained employment readily, but was prone to shift her jobs. Then she made what has been apparently a good adjustment in marriage.

Case L. A man of 25, of a large family of children. Much illness in childhood; not well adjusted to school or to playfellows. Chief satisfactions from family life. School progress fair to third year high, but has worked only in domestic situations. At present has developed some interest in hospital work and is referred by an institution for vocational recommendations.

Stanford examination yielded an average adult record, with an IQ of 86. An interesting feature of the psychometric study is a different impression gained by two examiners. The Stanford report says in part: "Patient had only a fair memory, poor practical judgment in the ball-and-field test, and his attempts at arithmetical reasoning were quite poor. In language ability, as shown in the vocabulary, he showed good record. He resorted largely to concrete

examples in trying to give explanations." The report of the examiner making more specialized vocational test says: "In tests concerned with clerical ability and manual dexterity a score below average was made, and he would be a doubtful vocational risk along these lines. A quite superior score was made in Healy PC-II. When he tried to describe anything in regard to his methods of solving the problems, he was much at a loss for words, giving very crude and misleading statements. He seemed almost to have a special disability for language. In view of these facts it is probable that something in not too specialized work with concrete material is called for vocationally, such as the hospital work that he is considering."

There is a detailed katamnesis, showing considerable effort on the part of the hospital where he worked and good responses of the patient, so that although not well endowed originally and with a difficult family situation in childhood, he has managed with some help to carve out a fairly independent little niche for himself. A normal amount of resistance, mental and physical, is hardly to be expected of him, but the solution reached is considerably better than could have been hoped for without the contact described.

Case LI. A man of 24; all information from patient. Family history negative, save that a sister is "nervous." High school graduate; occupations irregular; family now scattered. Complains of nervousness and desires vocational advice.

Stanford gives an IQ of 105, rather superior adult. An unusual feature was that the two 18-year tests passed were the paper cutting and ingenuity. In spite of this performance, the examiner speaks of him as a verbalist, talking glibly and polysyllabically. In specialized tests, showed first-class ability in functions related to mechanical sense and in a test of fine manual skill. These were his best performances along vocational lines. An association reaction series was also of an unusually subjective type and further emphasizes the better fitness for working with things than with persons that is brought out in the personal history. His intelligence is sufficiently good, so that he might carry these interests to a fairly high level, possibly the collegiate one of engineering. On the other hand, in a test of particular significance for the selection of office workers, he was neither rapid nor accurate — decidedly below average.

There is some psychoneurotic background which modifies the vocational prognosis to be made on a psychometric basis. He is

cyclothymic, and autoerotism is more of a problem than ordinarily. Very much of an "introvert," with a good deal of conflict between feelings of inferiority and compensatory pretensions. Psychiatrically it was felt that this man should learn to adapt himself to some simple vocational and social level as a preliminary to any adjustment in wider fields.

Following these determinations, the patient worked in a summer camp, where he was very helpful so far as the performance of duty, but had some difficulty with a superior, the responsibility for which cannot be fixed. He then enrolled at an educational institution extremely well adapted to carrying out the recommendations made from the psychometric findings, save that its academic requirements may be too exacting. No further katamnesis.

Case LII. A girl of 27, without home ties. Family background irregular, but psychiatrically negative. Has been a ward of the state for several years; made good school adjustments to second-year high school, but was less happy in foster homes. Described as a "neat, capable" business girl, careful of associates, but with developing psychoneurotic complaints (irritability, insomnia), at first thought to be of endocrine origin. Recently has been very depressed, although this is superficially well controlled. This brought her to hospital contacts; referred by Out-Patient Department for examination as to vocational capacities.

There is no record of a general intelligence test, although from the educational record this may be taken as above average. Above-average scores were made in all vocational tests given, outstandingly good along the lines of office work and first class in an "observation" test industrially utilized in the selection of personnel for inspectors' duties. The psychometric indications were also against the type of work she was doing, which involved relatively exacting personal contacts.

The depression subsided, and for some months she continued in this work under some dissatisfaction, left with a good recommendation, and obtained a clerical position elsewhere. This has been much more satisfactory to her, her earnings have increased, and she is studying to advance herself in it. When seen, she was in excellent spirits and appreciative of the help given her at the Hospital. Psychometric findings such as those obtained, if available earlier, might well have avoided the preliminary maladjustment.

Case LIII. A man of 29, sixth of ten children; heredity negative, save for an uncle with mental disease. Educational history normal to second-year high, but has been economically inefficient, continuing to live at home, doing chores about the place rather than seek a normally independent adjustment. Attitude has made him something of a problem in the household, and as it is now about to be broken up, he is referred to the Hospital for recommendations.

Stanford examination showed an IQ of 104, with comparable ability in performance tests of the construction puzzle type. In the picture completion tests he hesitated and worked without plan, very slowly, continually asking advice. The general deportment was extremely loquacious, maintaining a continual stream of talk except when interrupted. The striking thing was the lack of insight into his situation. He realizes that he does not get along well at home and that he is unable to support himself, but makes no endeavor to formulate a concrete plan. He has a number of weak suggestions to make about careers, which from the standpoint of ability are quite impracticable. "The only solution seems to be to make him accept some relatively concrete form of task as a means of livelihood. This will be difficult, but will be the only alternative to his being a private or public charge."

The patient was actually induced to accept employment at manual labor, and was able to hold position over several months, but always under protest and with more and more difficulty. He made some effort to study along his intellectual interests, but was not considered by instructors to show any real promise. Some persecutory ideas have also appeared.

One of the features of normal mental adjustment is the finding of value in what one can achieve. The most prominent feature of this case is a disharmony between the values which he might achieve and those which he actually cherishes. It is not possible to say that in an absolute scale of values, what this man can do and will not, is less worthy than what he would do but cannot. We are not told whether a ditch digger or a poet is greater in the kingdom of heaven. What the outcome will be is problematical, but it is fairly certain that a serious break in compensation was at least postponed by his psychiatric contacts and the contribution of psychometric study to a definition of the problem.

Case LIV. A man of 22; family history negative; school irregular, but finished high school at age of 17. Precocious intellectually,

with special interest in chemistry. Has held various positions in this field, but generally dissatisfied with them. Has had hypomanic episodes, in which ill-advised conduct consistent with such a condition has taken place. Insight into difficulties and lack of balance in personality, comes for advice.

Coöperation in psychometric tests was intense. All tests of the Stanford scale were done with apparent ease; Army Alpha yielded a score of 181 points, in the highest one half of 1 per cent. In the Kent-Rosanoff free association test the median time was 1.8 seconds; the frequency median, 1.53, which is highly individual. The contact of the responses was in keeping with unusual intelligence and showed nothing bizarre. The examiner comments generally:

"Not enough is known of the patient's spells of misconduct to understand them, but it is clear that in general his life during this time has been very poorly balanced. The absence of dissociative symptoms and of mannerisms and eccentricities, together with the good contact he makes with the examiner and his objective attitude toward his difficulties, speak for a favorable outlook. His difficulties seem to be yielding, and should continue to yield, to improved mental hygiene. He will probably do better living elsewhere than at home, where he can have more of the companionship of his own kind, which he says he misses. Nothing is now evident to contraindicate his pursuit of his scientific interests, but they will need to be heavily balanced by activities of a more primitive level. His Canadian suggestion seems as good a concrete plan as is at present available."

He had some very advanced chemical conceptions which could not be criticized from the point of view of psychology or psychiatry. While authorities were not inclined to take them at altogether their face value, it did not seem that they could be placed in any delusional category. Social adjustment often presents a difficult problem to schizoid personality of extreme IQ, hence the byword "eccentricities of genius"; and this difficulty may be accentuated in the adolescent years, because for adults specialized environments exist that will make allowances, or there may be a subsidence of an instability that has complicated the problem in late adolescence. The latter seems to have been a governing factor in the present instance. When seen a few years later, he made an unexceptionable appearance. He seemed emancipated from and reconciled to a home situation that had been distasteful to him. To his former difficulties he alluded as a mature adult might to an episode of calf love. He told circum-

stantially of interesting and exacting experiences in a foreign environment, and he had a vigorous posture and bronzed complexion, contrasting markedly with the previous impression. His scientific interests appeared to have receded into the background. If the appearance made at present represents a stable level, a distinctly superior type of adjustment is to be looked for in future years.

CHAPTER ELEVEN

OFFICE METHODS: GENERAL AND SPECIAL

Clinical files — Psychometric records in the clinical file — Laboratory files — Details of practice — Examination records in the laboratory file — Examining material — Property

FILING, record keeping, and office management have become highly technical arts because of their importance to organized industry and commerce. The record-keeping problems of the psychological laboratory are few compared with those of a large business, though they may be not less specialized. There are proved ways of meeting every record-keeping problem with which psychometric work is likely to be concerned. Not all of these can be taken up here. The reader likely to be responsible for such work in a large way will do well to supplement this chapter with some more elaborate treatises, such as are cited on page 309 (*136, 137, 138, 139, and 140*). Mateer's book (*17, 471*) also gives a number of useful hints unnecessary to repeat here.

Clinical files. The work of a clinical organization centers upon the individual patient. The first requirement is that all facts and observations concerning each patient be accessible as a unit. A record of all such data for each patient is commonly kept in a letter-size manila folder, which bears (1) the patient's name and (2) the consecutive number of his admission to the organization. This group of data is known as the "history." If there have been previous admissions, the numbers of these histories are noted. It is sometimes practicable to file all histories according to the number assigned to each case. Then if one wishes to look up the record of John Doe, one consults an alphabetical card index for this name, notes the case number attaching to it, and thereby locates the history. It may be observed that if the folders themselves were arranged alphabetically, one would not have

to consult the card index for the number of the folder. An alphabetical file is "self-indexing." It is not generally wise to file such records alphabetically, because the current histories which are consulted very frequently are buried among closed cases which are very seldom consulted. Alphabetical filing of such records is suitable only when all parts of the file are about equally active. It is unsuited to a large file, only a small portion of which is especially active. The usual practice is to file numerically (which is here also chronologically) all cases which are "closed." For practical reasons, cases whose records are still open are likely to be classified into one or more separate files — e.g., current cases; cases recently discharged, sometimes separated by sex. These files are regularly alphabetical. There is a card index giving name and number for each patient. It is uniformly alphabetical. One office may consolidate all these cards; another, for special reasons, separate the cards, as above. If it is otherwise practicable, the simplest file is a numerical one for all case histories, cross-indexed to alphabetical cards.

Psychometric records in the clinical file. The psychometric examiner is responsible for contributing to these histories certain records. No part of these records is more necessary than that which shows in which folder the record belongs. So far as the psychometric department is concerned, this is usually accomplished by a plain writing of the name and date. The requirement is less simple than it appears. Matteer's allusion to inferior observations compensated by "engraving-like beauty of written reports" is fairly balanced by reasonably careful observations recorded in so loose a manner that their essential value is subjective, to the examiner rather than to the patient. In active services, such as those of the Boston Psychopathic Hospital, efficient record keeping cannot be expected unless every letter of the surname is plainly legible to a clerk who never heard of the patient. Occasion-

ally the matter will be complicated by varying spellings of the name, even by aliases. The person making the record may fairly be held responsible for insuring that the name it bears corresponds with that on the history, subject to checking by the clerk who files the paper. An economical habit of indicating dates, such as 6-4-24 for June 4, 1924, is worth acquiring.

Every *piece of paper* bearing a record which is filed from the psychometric department should bear the patient's surname, followed by initials, and the date of the observation. The date also guards against confusion of identical names of different patients. (Rarely two persons of identical names are in the hospital together, and special designations must be used for such cases.) It is customary to note the time of beginning a psychometric observation, at least to the nearest quarter hour. In case two or more records are filed for the same date, the relative chronology of these is thus fixed. It should also be possible to identify the examiner. Initials suffice for all current purposes and probably for most practical ones.

The writer's general experience is against the use of printed forms for the *recording* of psychometric work. (This of course does not apply to printed forms which are themselves standardized experimental material.) The technology as a whole is not sufficiently stabilized. Modifications are frequently in order, and printed forms inhibit the carrying out of these. Well worth heeding is Mateer's (17, 84) caution against forms so complicated that they detract from particularized observations of the patient. For the Stanford scale, a record suitable for printing can be constructed. For other psychometric forms likely to be used, the duplicating machine is the most serviceable source. Different types of duplicating devices are suited to different requirements. The multi-graph, while extremely useful, is a more elaborate device

than is generally needed, and it does not readily print diagrams or special drawings. The mimeograph (wax stencil) type of machine will make as many copies of a form as are likely to be used in many months. As the form must later be written on, care must be used to have a grade of paper that will "take ink" from a fountain pen as well as from the stencil impression. Forms used in quantities of not much over thirty a month are suitably made on a device of the "Speedograph" or "Ditto" type. The stencil is simpler to prepare than for the mimeograph, and there is no difficulty about the writing quality of the paper, but the number of copies is ordinarily one hundred or so. All the forms used in the writer's office, except the Stanford, are made on a machine of this last type. The paper used should not only "take ink," but should be of sufficient firmness to withstand fairly frequent handling. Ordinary typewriter paper is in satisfactory use by the writer.

Laboratory files. When completed, the clinical records are placed in a designated file basket and thus given into the charge of the clinical files. From the point of view of instruction and research, however, the psychometric department must maintain a separate record system calculated for organizing data on special topics for many patients rather than, as clinically, the data on all topics for the special patient. Besides, it will have correspondence not of a clinical nature, and other "paper work."

Such a file is relatively complicated in proportion to its size. It embodies a variety of filing problems, but each on so small a scale that it is hardly profitable to call upon the elaborate indexing systems developed for business or library use. Save for a few general principles, its organization is a subjective matter, conditioned by the interests and mental habits of whoever is responsible for its contents. Some study of the file as such is always necessary before a newcomer can

use it effectively. The plans here suggested are those found serviceable in the writer's office.

Physically, the requirements of these records are satisfactorily met by the standard letter file and a limited use of the 3×5 card index. In view of the dimensions this file is likely to have, and the fact that there is here no general division of active and inactive folders, alphabetical filing is more serviceable. Accordingly each paper for the file should bear a designation showing that it is to be filed in a folder bearing that same designation. The problem of assigning the designation is psychological. What name, what word, is one most certain to think of when one wants to find that piece of paper? In many cases this question answers itself. Correspondence is naturally filed under the name of the correspondent. An exception to this would be in the case of a letter of recommendation. This would generally be filed under the name of the person recommended. In a more elaborate system the letter would be cross-filed between the writer and the person recommended.

The file designation must be assigned by some one who can sense the contingencies likely to cause that document to be looked for. While not beyond the province of a specially trained secretary who is in constant contact with the file and knows it well, it is a considerable demand to make of most clerical workers in the case of a file containing records of specialized scientific activities. In ordinary situations it will be appropriate for the person in charge of the office to assign the designation himself. If the words it is to be filed under appear on the document, as they generally do, they can be underlined in red pencil. Otherwise it is usual to write them near and parallel to the edge of the paper which will be uppermost in the jacket (folder) when the paper is filed. It will be well to underline them also in red pencil.

The papers bearing certain designations will in time become

too numerous for the capacity of a single folder. Some logical division of them into two or more folders must be made. The folders for a single correspondent may generally be arranged by year dates. The designation then consists of the name of the correspondent and the year date of the paper. A chronological division of this kind is the most generally serviceable, though other schemes may be needed. A collection of psychometric forms, records of experiments, would be most naturally filed in folders classified by the names of the assigned tests. Misfiling is somewhat more likely to occur in subdivided folders of this kind, and the designations should be especially plain.

Within a single folder the papers are generally arranged by date. The latest ones nearest the front of the folder is the arrangement preferred by the writer. A letter, of course, bears its own date. So should a test record. It is useful to assign dates to all papers filed — the date of filing, if no other date is more logical.

The file will also contain casual material of perhaps only one paper for a given designation. Separate folders for such papers are not always economical. A frequent practice is to have a single folder placed back of all the folders for a given letter of the alphabet, in which such papers are filed. The designation in such cases consists of an *initial* only. The scheme has possibilities of confusion with the other folders. One must not file a paper in the general folder without being sure there is no special jacket for the material, and if there is, one should alter the designation accordingly.

All papers to be filed or refiled are placed in a designated file basket used for no other purpose. Filing daily or on alternate days is generally sufficient. No matter what the freedom or restriction is in removing papers from the files, all filing should be done by a single person whose assigned function it is.

Details of practice. It is doubtful wisdom to insist on ink in psychometric records, but the No. 2 (HB) hardness of lead in common use blurs in the handling that records get, and its use should be discountenanced in favor of the harder No. 3 (H) or still harder leads or the fountain pen. Clutch pencils of an inexpensive type, with exposed and replaceable erasers, are very serviceable. A bit of No. 00 sandpaper or of whetstone will provide as sharp points as may be desired. There is also room for intelligent selection of paper-fastening devices. Clips of the "Gem" type are most easily attached and detached and are in very general use. They have, however, a propensity to pick up and "steal" papers which do not belong to them. While they are very good for desk use, one may be reluctant to put them on papers to go into a file. Clips of the "Owl" type are somewhat less easily manipulated, but they do not pick up strange papers and are well suited to papers for filing as a unit but which one may want to separate later. Papers essentially one, like the pages of a letter, are better clipped with fasteners of the "O.K." type. Where a considerable number of sheets, fifty or more, are to be fastened, the size 2 "Ideal" clip is very serviceable. Spring clips (the "Hunt paper clip" of the Stenquist scale), obtainable in many sizes, are excellent to fasten such papers for desk use and permit their being hung anywhere for easy access. For large numbers of sheets, two hundred or more, the "L. E. B. Binderclip" is excellent and has the special advantage of folding so as not to increase the space occupied. For the classification of papers in frequent desk use, a device like the "Work Organizer" is all but indispensable; a spring clipboard of the "Falcon" type, to secure test forms while being written on, is an equally desirable part of every examiner's equipment.

For the storage of office supplies, a sectional bookcase of any desired number of units is recommended. For this

ARTICLE	QUANTITY
Bands, rubber, assorted	$\frac{1}{8}$ pound
Basket, waste, Vul-cot No. 2	1
Baskets, letter, wire, 1-part	3
Blotter, desk	1
Blotter, hand	1 dozen
Cards, 3 × 5-inch, white, ruled	1000
Clipboards, striped board	2
Clips, paper, Gem, No. 1	200
Clips, paper, O.K., No. 1	100
Clips, paper, Owl, No. 2	100
Clips, paper, spring, "handy" or "bulldog," medium	6
Envelopes, correspondence, 6 $\frac{3}{4}$ -inch size	100
Envelope sealer, "Keane sanitary"	1
Eraser, typewriter	1
File, vertical, "Favorite," letter-size, 31-compartment	1
Folders, letter-size, manila	100
Guides, index, letter-size, press-board, set of 26	1
Ink, black	$\frac{1}{4}$ pint
Ink, red	$\frac{1}{8}$ pint
Inkstand, double	1
Leads for clutch pencils, black, H	1 box
Leads for clutch pencils, black, HB	1 box
Leads for clutch pencils, blue	1 box
Leads for clutch pencils, red	1 box
Letter opener, metal	1
Notebooks, stenographer's	6
Paper, carbon, typewriter, black, sheets	12
Paper, quadrille-ruled, 8 × 10-inch sheets	50
Paper, typewriter, standard, white, sheets	500
Paper, typewriter, yellow, sheets	1000
Paste, tube	1
Pencils, clutch	6
Penholders	3
Pen points, silverine	1 dozen
Rack, fountain-pen and pencil, upright	1
Ruler, 12-inch	1
Scratch pads, small	6
Shears, 8-inch, imported, pair	1
Tip erasers, pencil	1 dozen
Tissue, mending, roll	1
Work organizer, paper, 10-compartment	1

NOTE. At the time of writing, the above assortment could be furnished by Thorp & Martin, Stationers, Boston, Massachusetts, for \$28.76.

purpose, however, each unit should be supplied with two removable shelves, so as to afford three shelves, at equal distances, for each unit. A "Berloy" counter-height lock-storage cabinet "No. 842-G" is convenient for whatever small body of material it is desired to safeguard especially.

The list of minor office supplies given on page 257 may be a serviceable guide in the initial outfitting of an active examining unit.

Examination records in the laboratory file. It may well be impracticable to keep all psychometric records, or duplicates of them, in the laboratory files; in most cases their proper place is with the clinical history. The laboratory may, however, keep records by means of which such papers or groups of papers can be readily located. Such records in the writer's office are the following sorts:

The first is a list showing in vertical column all cases admitted; in horizontal column, the chief examination methods employed. If John Doe were given the customary examination for memory functions on March 1, 1923, the date 3-1-23 is entered opposite and under the names of the patient and examination, respectively. This serves in planning the psychometric work with new cases. It also facilitates knowing with what patients certain types of examination have been made and consequently the location of any group of records for special study. These sheets are filed chronologically in groups of thirty.

The second record is a card index, alphabetical by name. A sample card is shown on page 299. Its function is to give, with a few salient facts about the patient, an outline of the psychometric work which has been done. It serves (1) to answer calls for a brief statement of findings, (2) for the previous psychometric history of the case in reference to subsequent admissions, and (3) for the figures of a monthly report of examinations.

A daybook is kept, showing in the order of examination the following: (1) serial number of examination for the month (the "house" and "out-patient" cases are entered separately), (2) name of patient, (3) age, (4) nature of tests, (5) test ratings, (6) name of examiner, and (7) date.

A further record consists of duplicates of the "summary" sheets. These sum up the relevant findings of the psychometric examinations and are the main contribution of the laboratory to the clinical study of the case. The original goes to the clinical histories. The duplicates are filed chronologically in the laboratory, there being a separate folder for each month. The propriety of the laboratory's having this record of its particular doings is obvious. It is additionally useful in locating previous histories regarding which many salient facts are recalled, but no name that can be found alphabetically.

Examining material. The general supply of psychometric forms in current use may be kept in a "Favorite" vertical file. From this convenient and inexpensive device any form or group of forms can be readily picked out and the supply kept track of for renewal as necessary. These files may be obtained with seven, twenty-six, or thirty-one compartments. A compartment will hold a hundred sheets or more. The best use of this and other devices depends on all record forms being standardized to the letter-size page.

Material for non-language tests is naturally cumbersome to manipulate. Where portability is essential, a large briefcase will serve. A more convenient device is the "catalog case," sold in luggage shops; it will stand alone, upright like a small suitcase, but opening at the top. For the examining room a specially designed cabinet has been found very useful. The description here given embodies changes suggested by experience with those now in use. It should be a substantial box not less than 12 inches in width, 16 inches in length, and of

height according to the test material it is to house (30 inches will generally suffice). (All are inside measurements.) The front should be a door hinged at the side in such a manner that the door will fold back against the side. A lock to prevent intrusion is occasionally desirable. The interior should contain light, non-removable shelves, so spaced that there is not less than $1\frac{1}{4}$ inches of clear space between any two shelves, except that there are three spaces of double this extent (to house material for Porteus mazes, Healy Picture Completion Test II, and Cube Construction Tests). Each shelf should stop 1 inch short of the front of the box. Such a cabinet will house all the ordinary non-language test material except the Goddard Formboard, which conveniently rests on top. For carrying, a strong handle may be bolted on each side.

For each or nearly every one of the tests a tray is provided, consisting of a piece of beaver board $11\frac{1}{2} \times 15\frac{1}{2}$ inches. These trays rest upon the shelves and project slightly beyond them, so as to be easily removed and replaced. The dimensions given them are sufficient to allow tests of the construction puzzle type to be properly set up in advance, and this should be done where indicated. The standard placings of pieces, as described by Pintner and Paterson (2, 218), may be easily indicated in pencil on the trays. When a test is to be given, the tray on removal from the cabinet shows the test all set up ready for use. Naturally, the scrupulous examiner will afterward replace the pieces in readiness for the next examination.

There are on the market several assemblies of light wood and metal working tools, electrically driven. These should be adequate to the shop-work demands of even an active laboratory of clinical psychology. The present laboratory derives good service from a Hamilton Beach Type No. 102 electric motor, operating through a foot switch; a Millers Falls fret saw; also a Black & Decker 6-inch bench grinder,

equipped to serve in addition as a sander. This last feature is especially serviceable in renovating soiled formboards.

Property. Save as required by general authority, the writer has seen little serious effort to maintain property accounts in psychological laboratories. Of course it does not safeguard material merely to catalog it. A property system has been maintained in the writer's office because of inventory requirements and because the laboratory has charge of property of different ownerships. It has been quite satisfactory and may be briefly described, for any other contingencies where it may be of service.

The accounting scheme consists of a "property book," in which the items of property are listed in the order of their being taken up, as in the accession book of a library. Only "non-expendable" items are listed. The number of each item of property also recites the class of property to which it belongs; thus, 27 A, 36 B, 48 C (there are three classes of property actually involved). Each major item of psychological apparatus catalogued uniformly has affixed to it a label of adhesive plaster bearing its catalog number. This identifies its name and ownership. For each item listed there is made out a 3×5 card, which recites the name of the item and its number. These cards are filed alphabetically by the name of the item. In the case of unusual pieces of apparatus not readily identified, the card also recites a reference or references showing where further information regarding the apparatus is obtainable.

This is a feature whose value increases with the numbers of the department personnel and the frequency with which it changes. One comes newly into the laboratory and meets with an elaborate unfamiliar instrument, obviously an exposure apparatus of some sort, but whose origin and properties are not known. It bears the number 47 B. On finding this number in the "property book," one ascertains that it is

a Lipmann memory apparatus. Turning then to the card index, one finds that further information about it is available from a folder in the general file designated "Marx, M.," which contains a detailed description by the manufacturer.

REVIEW QUESTIONS AND EXERCISES

1. What is the usual advantage of alphabetical filing of "current cases" of a clinic?
2. What are some elementary precautions for keeping a file of papers intact?
3. Discuss the use of printing and duplicating machines in making psychometric forms.
4. Suggest ways of handling performance test material for laboratory purposes.
5. As far as practicable, the more important equipment mentioned should be exhibited.

CHAPTER TWELVE

PERSONALITY STUDY

Systematic methods — Special traits — Moral reactions

THERE is room for questioning the inclusion of this topic, for whatever its importance, it has at present little content that ranges itself under the usual conception of "psychometrics" (cf. 47, 289, 360). Its closest approach is through the already described association experiment. This chapter takes up some lines along which progress toward the psychometric level has been attempted; first with regard to the personality as a whole, and then concerning particular phases thereof, especially the moral reactions (cf. 9 a, 191-225).

Systematic methods. The most important origins of systematic methods for personality study are examinations of psychiatric cases, for here the most complete records are possible as well as desirable, system is the means to completeness, and the practical test is the most direct. Systems arising under these auspices are confined to reciting the topical headings under which the information is classified. From the way in which psychiatric information is gathered, one cannot prescribe the manner in which it is to be sought or the form in which it is to be given. But from the topical content standpoint, their contribution is much the greatest.

Schemata for personality observation are sometimes intended for direct use with the person studied or for indirect inquiry about him with another person. The former predominates with normal material; the latter, with psychiatric material. In form they may be designed for free answers (in own words) or for brief and fixed ones. The former are presumably more accurate; the latter, much more economical of time and comparable from the "survey" standpoint.

The two procedures have somewhat the same relation as the individual and group methods of intelligence testing (spotting).

Representative examples of schemata for personality study may be cited, as follows :

AUTHOR	DATE	FORM OF QUESTION	FORM OF ANSWER	ORAL OR WRITTEN	DIRECT OR INDIRECT
Woodworth (33) .	1918	Fixed	Fixed	W	D
Kirby (141) . .	1921	Free	Free	O	I
Peck	1922	Fixed	Free	W	D
Amsden (143 and 144)	1923	Free	Free	O	I
Tjaden (145) . .	1923	Fixed	Free	O	D
Peck and Wells (142)	1923	Fixed	Fixed	W	D
Laird	1924	Fixed	Fixed	W	D
Peck and Wells .	1924	Fixed	Both	W	D
Wickman	1925	Fixed	Fixed	W	I
Allport	1925	Fixed	Free	W	Either
Elkind (146) . .	1925	Fixed	Fixed	W	D

The simplest form of fixed answer is the underscoring of a *yes* or *no* attaching to the question, as in the Woodworth personal data sheet. Elaboration of this consists in phrased answers for checking, which will present various gradations between *yes* and *no* answers. The expressions must be chosen with some care, as in the questions themselves phraseology carrying a note of approbation or reproach will directly affect the responses. Examples of questions with phrased answers as reference points are :

In games such as tennis or chess, does gaining an advantage tend to make you over-confident?

(a) markedly (b) rather (c) not noticeably

Do you talk out your troubles —

(a) openly (b) unburden to close friends (c) keep to self

Fixed answers have effected an advantageous alliance with rating-scale technique. Quantitative ratings are by percentages or letter grades, as in academic markings (147). An advance upon this was a scheme for rating by relative position, such as found wide application in the Officer's Qualification Cards during the war. Theoretically excellent, it is so cumbersome as to yield in general to quantitative rating by marking off a point on a linear scale, a device developed by the one-time psychological staff of the Carnegie Institute of Technology.

Recently Laird, and also Wickman, have printed questionnaires which combine linear rating with phraseology serving as reference points for the various degrees on the scale. Thus one of the items given above might be cited as:

In games such as tennis or chess, does gaining an advantage tend to make you over-confident?	 Markedly Rather Not noticeably
--	--

The questionnaires of Laird and Wickman, following this pattern, are the best-constructed fixed-answer forms the writer has seen.

Fixed question and answer forms for the study of particular phases of the personality (special traits) can be adapted to persons of moderate intelligence. A proportioned study of the personality as a whole by direct means can only with difficulty be adapted to persons below the collegiate level of intelligence, say an adult IQ of 100. From the clinical standpoint it is fairly certain that the best form for such inquiry is fixed question, free answer, answers being oral. Fixed questions are subject to the same criticism as that made of some "questions" in the Binet scales. If A and B are two different persons, some questions must be differently framed in order to mean the same thing to each. The examiner may try to compensate this in the Binet tests. In personality

questionnaires adapted to more selected and uniform groups, the use of fixed forms of questioning is more justified. It remains true, however, that certain items are better adapted to fixed answers; others, to free answers. Under the conditions of his own work with individuals, the writer has made good use of oral questioning, with the latitude it gives in voice modulation as well as occasional matters of diction — with, of course, oral replies. But there is no doubt that written questions embody the more objective procedure.

An inclusive scheme of personality study must be modified at various points according to such factors as the age and sex of the individual. For male adolescents, one will hardly require a broader field of view than is embodied in the “analytical interview” of Tjaden (145). It contains some 300 items, classified under 19 headings and supplemented by an indirect questionnaire for developmental study. It is less adapted to the adult group which was in the present writer’s mind during earlier attempts (148). A revised form of inquiry has since been put into use, adapted more especially for males in early adult life. The topical headings have altered (though there is little purpose in having any), and the emphasis has shifted somewhat. The actual queries number slightly over 250; a condensation of them into topics of less than half their number is as follows:

Family

- Physical and mental characteristics of parents
- Relationship to each parent
- Adjustment to siblings
- Childhood feelings of superiority or inferiority
- Foster child fantasy

Intellectual life

- School history
- School subjects preferred and disliked
- Imagery type
- Reading habits
- Dream and fancy life
- Sense of humor

Economic life

Places of residence
General economic circumstances
Occupational history
Occupational preferences: ideational, mechanical, **social**
Saving

Social reactions

Adjustments to fellows, early and later
Hero worship
Athletic interests
Speaking habits
Persuasiveness
Sensitiveness to slights
"Good loser"
Repartee
Unburdening
Sympathy
Authority
Reasonableness
Play for stakes
Dress habits
Popularity
Pugnacity
Memory for names and faces
Flattery
Social organizations
Teasing
Advice sought
General likes and dislikes
Bashfulness
Theater
Public speaking
Effect of rivalry
Companionable
What qualities attract
Understood by others
Slighting responsibility
Get or give more in friendships
Executive aptitude
Friends above or below in status
Homesickness
"Inferiority complex"
Feelings of insecurity
Enduring friendships

Affective life

Buoyant or sober
Mood swings
Subsidence or persistence of affective reactions
Fault-finding
Injury to feelings (topics)
Hypochondria
Embarrassment (topics)

Unclassified items

Special accomplishments
Sleep habits
Somnambulism
Tea and coffee
Alcohol and drugs
Days sick each year
Food idiosyncrasies
Timid or danger-loving
Demand for variety in work
Careful of promises
Handy with tools
Mannerisms
Over-eating
Reaction to thunder, lightning, or loud wind
Stammering or stuttering
Bodily cleanliness
Tolerance of discomfort or pain
Tendency to weeping
Methodical
Continuity of energy output
Marriage history (age of partner)
Attitude toward children
Risqué stories, etc.
Homosexual attachments
Gossip

Balancing factors

Use of tobacco
Preferred career (rationalization)
Preferred recreations
Stability of vocational purpose
Religious history
Career in prospect
Admired personages in history or legend
Religious values
If living life again, more actual satisfactions

Sex life

- Earliest sex expressions
- Sources of information and reaction thereto
- Masturbation history
- Masturbation fancies
- Nocturnal emissions
- History of sex acts; amount, variety, chronology
- Contact with prostitutes
- Rationalization of conduct
- Love affairs
- Petting
- Sex or other "forbidden" talk, history, topics
- Details of sex satisfaction (fetishisms)
- Difference in management of sex life if lived again
- Venereal disease
- Family aspirations
- Disappointments (reaction)
- Attitude toward parents in relation to topic
- Daydreaming
- Sources of stimulation other than masturbation or opposite sex
- Attitude toward "single standard"
- Reaction to erotic reading or shows
- Sex ideals

At least some of the looseness of system evident above is intentional; shifting of and recurrence to topics often elicit fuller accounts, getting the subject to look at them from different angles. The insusceptibility to comparative treatment brings it only by courtesy within the sphere of psychometrics.

For the subject, the potential value of such studies lies partly in improved self-understanding, partly in "abreaction," and partly in such suggestions on specific points as a wise examiner may be able to make. It is open to question how far such schemata are to be commended as means of *self*-observation. From the point of view of mental hygiene, it is better to make such searchings of the heart a means of extraversion rather than of introversion, of contact with the environment rather than distinction from it. Where the desire for such observations is felt, it is better to record them

with another person, even though discretion and the confidence of the subject are the sole qualifications he possesses.

The objective results of such inquiries have been chiefly discussed by Hollingworth (148 a), and their limitations have had a critical scrutiny by Rugg (149). As in psychometrics proper, the aim is pragmatic, to predict the individual's conduct or to control the environment, and need not be further concerned with the reality of such accounts, philosophically considered (150, especially the opening paragraph).

The content of personality study as here described is material which is conscious at the first three levels formulated in Chapter VIII. Certain considerations affect quite directly the completeness of this, apart from any conscious desire to conceal. General push of speech or verbal inhibition determines whether a good deal of material is or is not given utterance. Further, experience shows that in the setting of such an interview much clearly relevant material may be temporarily out of consciousness, where it would be appropriate in response, only to come up later in some less relevant connection. These factors may considerably reduce the proportion of self-knowledge that is actually brought to light in a single survey. If it is practicable to document suitably the responses, it well repays itself to review them with the subject at a later date, for such elaboration and criticism as he may produce at this time.

Special traits. Interwoven with these general reviews of the personality have been endeavors to get more objective measures of specific traits. The writings of H. L. Hollingworth afford some survey of these. Among the more important contributions are those under the guidance of H. T. Moore, especially those on the laboratory measurement of interests (151) and the measurement of aggressiveness (152). In the former study there were created laboratory situations calculated to evoke the various types of instinctive response, and

the character of the reaction to these was studied. A more intensive research of the same type has since been reported by Landis (153).

In Moore and Gilliland's study of aggressiveness, ratings were made of the prominence of this trait in the various subjects, and the correlation of these with various test performances was observed. Comparison was made between an aggressive and an unaggressive group. The tests involved such functions as ability to meet the steady gaze of an official superior while performing a set task; ability to withstand distractions in performing the task, as from the gaze above described, electric shock, the exhibition of a fearsome object (snake), and a special form of the association test. Results led the authors to voice the belief that the aggressiveness is here measured to a degree superior to the Alpha test measurement of intelligence.

A different type of approach is represented in such studies as those of Shuttleworth (154), Roland Travis (155), and F. H. Allport (156). Instead of abilities, tendencies are observed. The method is to have the subject make choices among various verbally presented situations. The authors show considerable ingenuity in constructing these; the study of the tests offers only less interest than participation in them. Shuttleworth (154) directed attention to economic attitudes (money-mindedness, *Geldkomplex*). His verbal stimuli were to be marked according to degrees of liking or disliking. These were compared with ratings. Correlations in the 90's were observed between ratings and test performance. Certain of the "money-minded" group again underwent the test, with a motivation to dissimulate. The dissimulation was only moderately successful, correlation remaining in the 70's.

Roland Travis (155) formulated a set of fifty character traits and assigned to each trait two phrases in definition.

These hundred phrases were arranged in groups of ten. One form of the test (A) is to arrange the traits as represented in each set of ten phrases, in the order of desirability. Another form of the test (B) is simply to check the phrases according to like or dislike for the trait; also the extremes of like and dislike. Form A shows good "reliability" (correlation averaging 94), in that the same person reacts in about the same way at different times. The test reaction could therefore be considered something characteristic of the individual. It was found unrelated to intelligence measures. Then the effort was made to test the "validity" as an actual measure of character traits. Rating-scale methods yielded only low correlations. On the other hand, when the method was applied to psychotic cases, where histories afforded fuller insight into the personalities of the subjects than would be embodied in the rating scales, better correspondence was found. It is likely that most rating-scale conditions are not well enough controlled for the evaluation of a really searching character test, and that personality studies having a broad foundation in dynamic psychology are requisite for this purpose. Travis found also that mental conflicts were disclosed through inconsistencies of test response, as in wide departures from the norm, or inconsistencies between response, to Forms A and B.

Allport, in collaboration with Hartman (156), applied a similar but somewhat elaborated technique to measuring the conformity of opinion on certain public questions, seven in number, such as the League of Nations and the Ku Klux Klan. Sixty intelligent expressions of opinion were obtained on each of these, and on them was based the actual test material. A standard was reached through expert rankings of the opinions from one extreme to their opposite. An average of 367 reactions was obtained to the various issues. These were also rated by their givers in respect to certainty

of opinion and interest in the topic. It is not surprising that the two run nearly parallel. Both men and women were among those responding, the chief difference being an avoidance of the extreme positions by the women. There were distinguished reactionary, conservative, and radical types of response, and these were compared with further personality study undertaken through various available sources.

The chief interest of the findings centers about the similarities and differences of personality between the radicals and the reactionaries. That similarities should be expected has been philosophically pointed out by Inge; in the present study there is agreement in self-rating for several mental traits, and they agree here more closely than do "conservatives" with either. On the other hand, the reactionaries here considered show more evidence of tough-minded, extravert, syntonic nature, while the radicals considered show more "tender-minded," introversive, schizoid traits. Much of the interest of this study appears due to the care with which the experimental material was constructed and suggests that investigators along these lines can hardly devote too much effort to this aspect of their work.

Moral reactions. Educators have been concerned with certain tests as possible measures of the efficiency of work directed at "character building." The first noteworthy study undertaken from this point of view is that reported by Voelker (157). The test series organized by him was given to several school and scout groups. Two scout groups were selected for special training; two others served as controls. In the training received by the experimental groups emphasis was laid on "trustworthiness"; no such emphasis was present in the case of the control group. Using a "battery" of tests, Voelker observed point scores ranging between 50 and 80 in ten different school groups. Each of the two groups intensively trained in "trustworthiness" showed a relative

gain in point scores approximating 12 per cent on the test after the training period. The control groups showed a loss of apparently 9 per cent in each case, which may be taken to mean greater difficulty of the second series and emphasize the gain of the experimental groups. It is a fair inference that the discipline of the experimental groups, which were Boy Scout troops, contributed to their better showing at the end of the period. It is more questionable if the "trustworthiness" emphasis is largely responsible. Results are reported on two other scout groups (J and K). One of these, those without the "trustworthiness" emphasis, gained more than either of the experimental groups, while the other lost more than the controls. The difference is attributed to the character of leadership, and this is apparently the simplest way to account for the whole situation.

That the moral response of human beings, especially adolescents, is normally educable is scarcely an open question (but cf. 158, 26, 27, 30). The test scores may afford a good measure of the changes in moral attitude which take place during the periods of observation. Tests such as the present have not generally posited absolute moral values, but have simply endeavored to measure the conformability to whatever moral standards exist in the milieu where they are given (158, 17). A common experimental approach is to construct a situation of which the subject may take an "unfair" advantage, with means of observing if it is taken. Thus one observes the reaction on the subject's receiving through the mail a sum of money to which he is not entitled, and holding out opportunities for similar increments in the future. Many variations of this general theme are found in such studies as those of Voelker and Cady. Nine other types of observations which might reflect tendencies to antisocial conduct are enumerated by Cady (158, 47). There are not wanting theoretical objections to any and all as criteria of moral tenden-

cies, and it is necessary to fall back upon the judgment of competent superiors as a criterion for evaluating the tests. The degrees of confidence felt in the ratings were observed and were found to be a good criterion of their reliability (158, 34).

As it is misleading to check test results against unreliable ratings, one is not unjustified in basing one's conclusions largely on cases where ratings were "reliable." As they will agree, however, where the traits are actually most strongly marked, confining one's attention to them may, in turn, give an impression of closer test correlation than would exist in general practice.

The limitations of group as compared to individual testing, mentioned with regard to intelligence tests, are similarly operative in the present field; but that group tests have here a genuine function is shown in Cady's work, in which he ordinarily observed groups of twenty-five. The years 12½ to 14½ appeared the most suitable for study, and for comparative purposes a group from the Whittier State School was included. The tests included a specially designed questionnaire; also an association test (after Pressey), in addition to others more like those used in the ground-breaking work of Voelker. Among them all, the most encouraging correlations appear with an "over-statement" test; i.e., a gauge of the subject's tending to give exaggerated accounts of his abilities or accomplishments. The questionnaire used is also well spoken of, while the "discrimination" test is commended only with reserve for the purpose in hand. No doubt it can be technically improved, but in its essential nature it reaches moral perception more directly than moral tendency.

On the whole, when one compares the situation in this difficult field with that which existed in "intelligence" measurement twenty years ago, one is entitled to agree with Terman

(158) that the problem of diagnosing, if not measuring, anti-social tendencies is similarly capable of scientific solution. Its mechanisms, however, are scarcely less in number than those of intellectual difference (158, 30), and these will remain separate problems, as they are in feeble-mindedness today. It is more difficult, however, to share the skepticism expressed with regard to morality as an age function. The verdict of unorganized experience is all in favor of a definite growth function, both in moral tendencies and ideas. It would be surprising if refined measures do not bring developmental norms in this field also.

There is a phase of these latter studies which has not had as serious attention as it deserves. The search after facts is an important value, but it is not an absolute one, and it must not impair other and equal values in its process. This has been well illustrated in animal experimentation, where it is generally conceded that uncontrolled license of the "research" spirit will not be without grave abuse. Much of the work above described approaches this situation as closely as any human experiments.¹ In itself it is treating the individual "as a means" in the most Kantian sense. There is no escape from the fact that a child who yields to the experimental temptation is by so much the worse for it. He has done a wrong action he would not otherwise have done. "Sow an action and reap a habit; sow a habit and reap a character; sow a character and reap a destiny." The experimenter has sown a wrong action in that child's character. The systematic practice of such deceptions might even have drawbacks for the mental hygiene of the investigator. As the physician may have to inflict a minor injury in order to treat a greater one, so may the educator learn by such means something about his charges that will be of value in his man-

¹ It should be noted, however, that techniques recently developed by Raubenheimer (159, 485-517) are in great measure free from these objections.

agement of them. In animal experimentation we do not require that the experiment be made for the benefit of the animal itself. But our society is most reluctant to sanction the experimental usage of human beings for the benefit of other human beings. The discreet investigator along these lines will therefore make the utmost use of his results for the benefit of those from whom they are obtained, and in the first instance assure himself of the sympathy for his work of those responsible for the well-being of his subjects. Such precautions seem necessary to keep the conduct of these researches within the bounds of scientific ethics.

REVIEW QUESTIONS AND EXERCISES

1. Compare the fixed- and free-answer methods in personality study, with examples of situations calling for each.
2. What are the advantages of rating traits on a linear scale?
3. If conditions permit, a reasonably full personality study of the free-answer type should be made by each student. Allport, or pages 266-269, may be used as a guide. It is best, however, to undergo such studies before attempting to make them, nor should they be made without a background of dynamic psychology outside the scope of this volume.
4. Experiments like those of Allport, Shuttleworth, and Travis may be repeated with the class.
5. Outline four or five experimental methods for gauging the response to a moral situation.
6. Discuss their limitations as criteria of moral fiber and the precautions that should be observed in undertaking to test the moral reactions of children.

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CASE MATERIAL

The following (Case LV) gives in part the response to the scheme of inquiry described on pages 266-269 by a man of 20, whose psychometric ratings are distinctive. The material was derived not through clinical channels, but through the writer's general interest in adjustment processes; there is no "complaint." The Alpha score is at the 94th percentile. An industrial test of fundamental aptitude for office work scores at the 91st percentile; a similar test for mechanical aptitude, at the 97th percentile. The "observation" test above cited scores at the 97th percentile; a rather special manual dexterity test, at the 21st percentile; group contact as given in the Kent-Rosanoff association test is roughly at the 62d percentile. The individual concerned is carrying simultaneously a college course and a full-time salaried position. By these quantitative standards a quite superior personality is indicated. To what extent this carries over into qualitative fields, the reader must estimate from the account that is to follow.

This seems also superior, though the very concept "superior personality" is a value judgment of no little subjectivity. Fundamental superiority along quantitative lines may complicate the problem of social adjustment, as symbolized in Andersen's "Ugly Duckling" (a swan); though Terman's study would indicate that in general, as apparently here, a quantitative superiority goes along with other traits which elicit favorable responses from the group.

The notes were taken in abbreviated longhand, and the text is a reproduction of these, a few words being added where necessary to indicate the nature of the query that is being dealt with. Otherwise there is a minimum of editing, which is the reason for the abrupt style found in the material. Worth noting is a tendency to make a definite answer to a question in the abstract, and thereupon give various supporting evidence.

Case LV. Very much friendship between self and father. When out on trips he would take me along, hikes together, reading, discussing problems. As I grew older, in scouts, went on their trips, bunched together rather more than with other fellows, seemed to understand each other well. In automobile, one sleeps while the other drives, could do things for father in business, knowing what he would do. Criticize each other freely. Away from home, knew father in letters as not before. Has perfect confidence in me, never questions what I do or where I am. Always can turn to him regardless of what happens. . . . Would not say was shown off as a child especially; still, possibly as much as or more than average child. Parents always interested in pushing us ahead, not so much to show off, as incentive to do a thing well. No feeling of inferiority, but never felt degree of superiority that might seem natural from standing of

family, no deep sense of self. . . . Moderately well-to-do family. Never asked father for money because rather earn own. About time of my going to college family lost money; had to make own way after that. No anticipation of inheritance. . . . Have tried almost all occupations for variety: selling insurance, railroad, office work, summers on ranch, scout work, cafeteria restaurant work. Some manual labor; have taught gym and swimming classes. . . . Maximum earning about \$200 a month from insurance; have made more than that for short intervals . . . now carrying a full college course and full time to my job. . . . Work like farming would be agreeable if did not feel bigger field for service elsewhere; if doing it on scientific basis, that might help; doing it thoroughly; chicken raising or hog raising, like it, but do not feel biggest service for me. . . . With machinery, can again enjoy work, thrill in it such as the locomotive engineer; like to drive, but never great desire for that type of work; others enjoy more than I, more successful in it. . . . Organization work I have always liked; have done it since 14 years old. At 13 was political boss for my class, engineering class elections. Last Saturday evening took care of 125 young people, planned the work; the rest of the evening took care of itself. . . . In last year and a half have done considerable for influencing people indirectly, printing an average of 12-15 articles a week; am sometimes more concise in writing than in speaking; have charge of posters and advertising in department I am in. . . . Best college grades in science, chemistry; also highest grade in ornithology; if cared enough for science to follow it, could be very successful, but prefer mixing with people; rather handle people than inanimate objects. . . . Not much dream life, possibly of something occurring the day before; wake up with alarm clock; seldom any vivid dreams, sometimes of people without recognizing faces, mostly in half-waking state. . . . No nightmare, or nothing to call that; one once after no sleep for many days, nothing bad, did not dream any one choking me or anything like that; always sleep extraordinarily sound; wake up almost instantaneously. . . . Rather quick at seeing jokes in movie shows; among first three or four people to laugh at one; also in class seem very quick in this respect. . . . Enjoy humor that is subtle, deep, have to think twice to get it, like search for precious stones. Clean humor that carries a good point with it; do not like sarcastic biting humor. . . . Do appear absent-minded at times; can be so lost in a subject that people may

walk into the room and I not notice; frequently can be lost except for very large disturbance. . . . Have got along better with small groups than large; also adjusted to large groups, had lots of friends, but one or two more intimate than others. One of the things I had to overcome was the inability to associate with people as well as I wanted to; never bashful, but not perfectly at home feeling. . . . Always a good mixer, yes; best indicated by offices I have held, captain of basketball team, etc., etc. [enumerates a large number]. . . . Enjoy argument convincing people, or declamations, discussion, argument, debate; really revel in being able to convince a man to my point of view, or if he can convince me, I am willing to admit that he is right. . . . Have always talked to groups of people and have enjoyed it, do it up to five times a week; much practice in debating teams; was captain one year; have led discussion groups and had classes. . . . Sympathize with others' troubles as fully as possible with knowledge of conditions and the experience I have on the subject. If it is his own fault, tell him so as well as know how. Person looking for sympathy might not think me sympathetic, yet I have all regret they are in trouble. Sometimes I think I am more sympathetic than is for the good of person, a trait inherited from mother largely. . . . If I think it belongs there, I will accept authority over me, but if I feel something is being put over on me, will get out at first opportunity. Combat openly if possible. If confidence in him will allow, possibly make suggestions, if he is open to them. . . . Might not readily change by reasoning, but if logical, will change as soon as I can see the point. Will admit when convinced and will fully, but do not take attitude, "I can be persuaded, but I'd like to see the man that can persuade me." . . . In one way am critical of judgments of other people; in another way, not. Hold nothing against a man and willing to give him benefit of all doubt. Analyze friends carefully, even test them sometimes to see if he is the friend I am looking for. . . . Seem a little more popular than others. I can go into a group, mix well and rapidly. Am accepted quickly in groups, in planning parties, and depended on for arrangements. . . . Not much fighting as a boy, only two fist fights, two wrestling matches, one started myself. Never looked for or avoided scraps, but never seemed to have mix-ups of that kind. . . . Do not remember names, but do faces. Can recognize one again in a thousand. Names fairly well, but not especially. . . . Have been generally well liked by fellows; given a present

by them on leaving home. The boy-scout troop gave me a farewell party. The fact that I do not dance limited the parties that might have been given. I do not want them to make a fuss over me; rather have lasting friendship after I left. . . . React openly to correction by superiors. If one gives advice, do not contradict it, but if I follow it depends on how I feel; may resent it inwardly or may refuse demands. Have had difficulty in past about accepting advice, but overcome it in past three years; must be done tactfully, might thank for it but only formal politeness. . . . Up to past two years chief friendship with older people, then with own age, now also with younger people. They may take me for older than I am. Find the bunch here do not believe me if I tell them my age. . . . Advice has been considerably sought since here; saw three men this morning; biggest handicap is my age, am waiting to develop. Probably more sought than average person of my age. . . . Am not bashful, mix easily; if go to a new place, one of the first to get acquainted. . . . Not hard to speak opinions in open meeting if asked; sometimes volunteer opinion. Active in forums and debating; good ability to analyze questions before the house. Have several offers to speak because of that. . . . The faster things move, the better I like it, if I can keep up. . . . When things move fast with plenty of pep, I like it very much. Prefer taking pleasure with others; always enjoy more when others having a good time; like to see people enjoy things. If have something good, want to share it with some one else; feel selfish if not. . . . About average to express sympathy. In movies, if touching scenes, chances are be tears in eyes. . . . Not notably dependent on sympathy in own difficulties. If some one had confided in me, that would encourage me to go to them. . . . Competition is a spur to me, a challenge in itself, and in many ways I think more of challenges; the harder the thing is, the harder I tackle it. . . . In regard to education and finances, have felt insecure, because could not give full time to school and work. Having to earn daily bread to go on in school, I sometimes worry about my studies; having to spend so much time on work to detriment of studies. . . . Accustom myself very easily to new surroundings; when on sea voyage, made friends with captain readily and very much at home all the time on board. If in farming community, talk farming or cattle; that is my chief interest. . . . Sleep soundly, regularly, 10:30-6:30; if get up, then much better than if lie around awhile. Get in bed and in half an

hour am soundly asleep, but can wake up instantly on alarm; if tired can sleep anywhere. . . . Once or twice have talked in sleep when under much strain from overwork and loss of sleep; replied in sleep to question, not in ordinary sleep. . . . Very, very little coffee or tea; cup of coffee once a month perhaps. In dress, just as careful as can be with what I have to dress with; never able to afford fancy clothes, but keep in clean condition as well as possible. . . . More impulsive than cautious. Generally find things best on first judgment. Deliberation, hesitation, destroys incentive, power, to drive me through a thing. In such a thing as a newspaper article, will go back and weigh correct expressions, but in general the first thought is the best with me. . . . Out sick on average three days in the year, if that much; tonsils operated on one day, working the next. Recover very rapidly from anything of that type. . . . Not especially tired after night out; if enjoyed evening, perhaps a little keener in spirit than before. If fine type of evening, better; but if boring, not so. Noises such as Fourth of July no disturbance. The faster a thing moves, the better I like it, or if I am busy at something, they can have all the noise about me they want to and very seldom bother me. . . . I dislike monotony; will make variety if nothing else. The more situations one meets, the better equipped you are to meet life situations when they arise. Dislike routine work; can do it well, but want things more constructive. . . . Very easy to do without accustomed comforts; adjust self to new modes of living; assimilate new surroundings easily; do not mean lose moral standpoints by change of surroundings. For example, at a banquet, make it a business to know the right fork to pick up, etc., but at camp meeting, meet the camp side. Have for that reason taken many jobs just to know what they had in them. At junior prom knew no one but girl I took; when left, was leader of box. Leader in hikes and social groups. . . . Not very handy with tools, but have driven car; no mechanical training, but like to work around house; have own chemical and electric shop; not much on fine points, but ordinary tools can handle very nicely. . . . Not discomfited by the sight of blood, no. I have sewed fellows together. Served as camp doctor in scout troops for years. . . . Tolerate discomfort or pain well; can stand hardships. Have gone most a week without sleep; very good endurance outside or inside work. . . . I like children; always get along with them. If I go to a place, I am welcome to go back again, particu-

larly if there are children. . . . I like good stories and lots of them, but dislike rotten stories, sometimes without saying anything, but won't laugh or give my approval to it. . . . No tobacco in any form. . . . Always had natural inclinations for executive work, from father's business and law. At 15 had been president of all young people's societies in the city; similar story in state organization and in college. To be able to convince people, move them to better way of living, supreme end. Every one looking for happiness, and to supply them with true happiness, best thing you can do. Always wanting to do something that would be permanent and spread out much beyond self. Law points toward high position, but this means only self, but if you can train three or four others to be better than yourself, you have multiplied yourself by just so much; in doing that I have radiated influence out, whereas otherwise only done what I myself could do. . . . Particularly enjoy such games as basketball, swimming, tennis, track; never played football, like to watch it. . . . Have changed ideas about career. Hardware business first; then saw bigger field of service in medicine; then end bigger in what I am in now, with possibility of tying this and medicine together; it may take on an international aspect; have changed from desire of a position of personal honor to where thought more service. . . . Baptized in Congregational church; grew up in Episcopal, been Episcopal all my life; lately been going to Methodist church because no Episcopal church handy. As child, attended church about four times on Sunday; now go to church three or four times on a Sunday. Very firm religious faith. Mother taught me Bible when young. . . . Within past year came to point where thought studies tending to atheism or fatalism. Period of doubt. One Sunday night came to decision; since then different idea, also from fundamentalism to more modern type, now must interpret it according to time when produced, experience same, but different expressions; conception of religion enlarged to me in that come out with purpose to make Christ more of a reality in my life. . . . Open-minded toward other religious beliefs; believe in interdenominational work; have done lots. Scorn no man's religion; admire him if he sticks to it, but try to show him his religion not to same end as mine is. Believe ardent Hindu will make ardent Christian. . . . Believe in life after death. Christ rose from the dead and went into heaven; said He was preparing a place for us; and since no one greater than He, see no reason to doubt His

word; second main belief in future life; this is a preparation for it, everything to gain and nothing to lose, because if it is any happier hereafter, you get that also. . . . Most firm convictions are that Christ was the greatest man, the Son of God; the Holy Ghost within us is what brings us to communion with God. The Bible is the revelation of the way; Man is the ultimate of earth; Christ came on earth to make man happy. If one meets man's need as Christ did, will make man happy. Meeting man's actual need, if looking for a job, may need a meal, and vice versa. . . . Man I have most admiration for is X, who died last year; then Lincoln; then St. Paul. . . . Never more than normal curiosity about sex; always on high plane. Father always answered all questions; never any abnormal desires; association with either boys or girls not along that line. . . . For instruction, father answered all questions, reading largely; had an older friend who told me many things. So far as know, as well-versed in sex matters as any one of my age. Want to bring right knowledge to girl I marry. If I do not know things the right way, may be bad consequences; always want things to be best imaginable for girl I marry. . . . At 14, saw a cousin of mine masturbate, and he did it to me, did it two or three times, but I disliked it; if not for him showing me, would not have known about it for years afterwards. No fancies, only the physical sensation. . . . No problem now. . . . No sexual intercourse. . . . Restrained by own ideals. Girl I have pal'd around with last five years always highest type; never had such ideas toward her; I never want to come to girl I marry with any taint of that sort in my mind. Want to come to girl I marry pure in every respect. In fact, I would be more strict with myself than with any one else; what others do I can forgive, but never expect of others what not do self. Father told me any questions I asked him, which resulted in my curiosity being satisfied for the time being; when had any other case of curiosity, came to my father as early as I can remember; always came to him with anything. My mother not so much on that, but when I found the pain she had gone through to bear me, had greater respect for her than ever before; always felt this to be man's prime duty to teach his son. . . . Chances to go on petting parties, but felt not give self except to girl going to marry; give self to her completely. . . . Learned how babies come from father at 10 years, perhaps younger, 7 to 10. Exact physiology I learned at 14 from books and diagrams. . . . Standard for men should be higher than

for women now. Both should be at high level. Practically I condemn no person. I am sorry for them; if any man or woman makes misstep, instead of kicking them in the gutter, they need help. . . . Believe God so constructed us that we have desire with us all the time and it should be used; otherwise man only has intercourse three times in life if only wanted three children; when last degree of affection between man and woman, to use only for propagation, too great a strain; so I say I believe in birth control.

APPENDIX ONE

Appendixes I-V allude to the Stanford scale (Chapter III); ¹ VI and VII, to the Army Alpha tests; VIII-X, to the memory test (Chapter VIII).

TABLE OF ADULT INTELLIGENCE QUOTIENTS CORRESPONDING
TO MENTAL AGES IN MONTHS

TOTAL MONTHS' CREDIT	QUOTIENTS	TOTAL MONTHS' CREDIT	QUOTIENTS	TOTAL MONTHS' CREDIT	QUOTIENTS
25	.13	96	.50	167	.87
27	.14	98	.51	169	.88
29	.15	100	.52	171	.89
31	.16	102	.53	173	.90
33	.17	104	.54	175	.91
35	.18	106	.55	177	.92
36	.19	108	.56	179	.93
38	.20	109	.57	180	.94
40	.21	111	.58	182	.95
42	.22	113	.59	184	.96
44	.23	115	.60	186	.97
46	.24	117	.61	188	.98
48	.25	119	.62	190	.99
50	.26	121	.63	192	1.00
52	.27	123	.64	194	1.01
54	.28	125	.65	196	1.02
56	.29	127	.66	198	1.03
58	.30	129	.67	200	1.04
60	.31	131	.68	202	1.05
61	.32	132	.69	204	1.06
63	.33	134	.70	205	1.07
65	.34	136	.71	207	1.08
67	.35	138	.72	209	1.09
69	.36	140	.73	211	1.10
71	.37	142	.74	213	1.11
73	.38	144	.75	215	1.12
75	.39	146	.76	217	1.13
77	.40	148	.77	219	1.14
79	.41	150	.78	221	1.15
81	.42	152	.79	223	1.16
83	.43	154	.80	225	1.17
84	.44	156	.81	227	1.18
86	.45	157	.82	228	1.19
88	.46	159	.83	230	1.20
90	.47	161	.84	232	1.21
92	.48	163	.85	234	1.22
94	.49	165	.86		

¹ This material is derived from Wells, F. L., and Kelley, C. M., "Intelligence and Psychosis," *American Journal of Insanity*, Vol. 77 (1920), pages 41 ff.

APPENDIX TWO

ALTERNATIVES FOR MEMORY FOR DIGITS

(Tests III-a1 *et seq.*)

1	<i>a</i>	173 958 426	5	<i>a</i>	362 591 847	9	<i>a</i>	269 583 714
	<i>b</i>	518 472 693		<i>b</i>	827 164 953		<i>b</i>	372 941 586
	<i>c</i>	295 361 847		<i>c</i>	958 371 426		<i>c</i>	416 395 827
2	<i>a</i>	275 184 936	6	<i>a</i>	261 847 395	10	<i>a</i>	283 649 175
	<i>b</i>	748 259 163		<i>b</i>	384 169 527		<i>b</i>	942 715 863
	<i>c</i>	839 615 274		<i>c</i>	961 742 853		<i>c</i>	697 384 152
3	<i>a</i>	941 582 736	7	<i>a</i>	692 853 714	11	<i>a</i>	271 584 936
	<i>b</i>	836 417 295		<i>b</i>	263 174 958		<i>b</i>	385 927 164
	<i>c</i>	627 195 384		<i>c</i>	742 615 839		<i>c</i>	194 862 537
4	<i>a</i>	716 385 942	8	<i>a</i>	263 917 485	12	<i>a</i>	958 273 164
	<i>b</i>	529 473 618		<i>b</i>	847 396 152		<i>b</i>	269 415 837
	<i>c</i>	615 382 749		<i>c</i>	691 584 273		<i>c</i>	395 271 648

APPENDIX THREE

ALTERNATIVES FOR "REVERSED CLOCK"

(Test XIV-6)

	ORIGINAL POSITION	REVERSED POSITION	ORIGINAL POSITION	REVERSED POSITION	ORIGINAL POSITION	REVERSED POSITION	ORIGINAL POSITION	REVERSED POSITION
	1	2	3	4	5	6	7	8
<i>a</i>	3.36	7.18	2.16	3.11	10.34	6.53	11.04	12.55
<i>b</i>	8.13	2.41	12.26	5.02	4.57	11.25	4.27	5.22
<i>c</i>	12.41	8.03	1.41	8.08	9.39	7.48	2.21	4.12
<i>d</i>	10.19	3.51	9.14	2.46	12.16	3.01	1.36	7.08
<i>e</i>	5.52	10.29	6.58	11.35	2.41	8.13	12.51	10.04
<i>f</i>	7.23	4.37	4.47	9.24	11.49	9.59	8.18	3.41
<i>g</i>	11.14	2.56	11.24	4.57	5.02	12.25	5.42	8.29
<i>h</i>	9.04	12.45	10.09	1.51	7.53	10.39	9.09	1.46
<i>i</i>	4.32	6.23	8.03	12.40	1.26	5.07	6.48	9.34
<i>j</i>	2.46	9.14	3.52	10.19	3.06	1.16	3.31	6.18
<i>k</i>	6.28	5.32	7.33	6.38	8.23	4.42	7.13	2.36
<i>l</i>	11.09	1.56	5.37	7.28	6.13	2.31	10.59	11.55
	9	10	11	12	13	14	15	16
<i>a</i>	8.38	7.43	5.17	3.26	7.58	11.40	5.32	6.28
<i>b</i>	12.05	1.00	4.52	10.24	2.51	10.14	8.08	1.41
<i>c</i>	5.22	4.27	3.47	9.19	11.44	8.59	6.43	8.34
<i>d</i>	1.46	9.09	7.08	1.36	12.21	4.02	9.59	11.50
<i>e</i>	3.01	12.15	9.29	5.47	5.07	1.26	7.03	12.35
<i>f</i>	1.56	11.10	9.44	8.49	6.03	12.30	1.51	10.09
<i>g</i>	2.56	11.15	10.04	12.50	3.26	5.17	11.39	7.58
<i>h</i>	6.53	10.34	6.23	4.32	4.12	2.21	2.26	5.12
<i>i</i>	9.34	6.48	8.58	11.45	1.31	6.08	10.49	9.54
<i>j</i>	10.29	5.52	12.36	7.03	10.39	7.53	4.17	3.21
<i>k</i>	7.18	3.36	1.11	2.06	11.19	3.57	8.53	10.44
<i>l</i>	4.42	8.24	2.31	6.13	8.48	9.44	12.11	2.01
	17	18	19	20	21	22		
<i>a</i>	6.18	3.32	3.11	2.16	4.02	12.20		
<i>b</i>	9.24	4.47	7.43	8.39	5.47	9.29		
<i>c</i>	11.29	5.57	1.16	3.06	6.08	1.31		
<i>d</i>	1.00	12.05	11.34	6.58	11.54	10.59		
<i>e</i>	2.06	1.11	10.24	4.52	10.14	2.51		
<i>f</i>	5.12	2.26	2.01	12.10	2.36	7.13		
<i>g</i>	10.44	8.54	5.57	11.30	3.41	8.18		
<i>h</i>	4.37	7.23	9.54	10.49	9.19	3.47		
<i>i</i>	3.21	4.17	12.46	9.04	7.28	5.37		
<i>j</i>	3.57	11.20	6.38	7.33	12.56	11.05		
<i>k</i>	7.48	9.39	8.28	5.42	1.21	4.07		
<i>l</i>	12.31	6.03	4.07	1.21	8.33	6.43		

APPENDIX FOUR

ALTERNATIVES FOR "ENCLOSED BOXES"

(Test XVI-4)

	A LARGE BOX	CONTAIN- ING SMALLER BOXES	EACH CONTAIN- ING STILL SMALLER	IN ALL		A LARGE BOX	CONTAIN- ING SMALLER BOXES	EACH CONTAIN- ING STILL SMALLER	IN ALL
<i>a</i> 1	1	1	2	4	<i>c</i> 1	1	1	3	5
2	1	2	2	7	2	1	2	3	9
3	1	3	1	7	3	1	3	2	10
4	1	4	4	21	4	1	4	3	17
<i>b</i> 1	1	1	1	3	<i>d</i> 1	1	1	4	6
2	1	2	4	11	2	1	2	1	5
3	1	3	3	13	3	1	3	4	16
4	1	4	2	13	4	1	4	1	9

APPENDIX FIVE

ALTERNATIVES FOR "INGENUITY"

(Test XVIII-6)

	3-STEP	5-STEP	7-STEP	9-STEP	11-STEP	13-STEP
A. fill larger measure first.						
1	2-3-1					
2	2-5-3	2-5- 1				8-9- 4 (15)
3		2-7- 3				
4	3-4-1	3-4- 5				
5	3-5-2	3-5- 7				
6		3-7- 1	3-7- 8			
7	3-8-5	3-8- 2	3-8-10	3-8- 7		
8	4-5-1	4-5- 6	4-5- 2			
9	4-7-3	4-7-10	4-7- 6	4-7- 2		
10	4-9-5	4-9- 1	4-9-10	4-9- 6	4-9- 2	
11	5-6-1	5-6- 7	5-6- 2	5-6- 8		
12	5-7-2	5-7- 9	5-7- 4	5-7-11		
13	5-8-3	5-8-11	5-8- 6	5-8- 1	5-8- 9	
14	5-9-4	5-9-13	5-9- 8	5-9- 3	5-9-12	
15	6-7-1	6-7- 8	6-7- 2	6-7- 9	6-7- 3	
16	6-8-2	6-8-10				
17	7-8-1	7-8- 9	7-8- 2	7-8-10	7-8- 3	7-8-11
18	7-9-2	7-9-11	7-9- 4	7-9-13	7-9- 6	7-9-15
19	8-9-1	8-9-10	8-9- 2	8-9-11	8-9- 3	8-9-12
Duplicates.				3-7- 5	5-7- 6	5-9- 7
"						7-9- 8 (15)
B. fill smaller measure first.						
1	2-3-4					
2		3-4- 2				
3		3-5- 1	3-5- 4			
4			3-7- 2			
5			3-8- 1	3-8- 4		
6		4-5- 3	4-5- 7			
7		4-7- 1	4-7- 5	4-7- 9		
8			4-9- 3	4-9- 7	4-9-11	
9		5-6- 4	5-6- 9	5-6- 3		
10		5-7- 3	5-7- 8	5-7- 1		
11		5-8- 2	5-8- 7	5-8-12	5-8- 4	
12		5-9- 1	5-9- 6	5-9-11	5-9- 2	
13		6-7- 5	6-7-11	6-7- 4	6-7-10	
14		6-8- 4				7-8- 4
15		7-8- 6	7-8-13	7-8- 5	7-8-12	7-9- 1
16		7-9- 5	7-9-12	7-9- 3	7-9-10	8-9- 5
17		8-9- 7	8-9-15	8-9- 6	8-9-14	8-9-13 (15)
Duplicates.				8-7- 5	5-7- 6	5-9- 7
"						7-9- 8 (15)

APPENDIX SIX

Approximate per cent of adult records surpassed at various Alpha score and IQ levels. Based on 23, 195, 666, Table 183; cf. also 49, 133-134.

Alpha score not less than	15	30	45	60	75	90	105	120	135	150	165	180	195
Adult IQ not less than	64	73	80	86	92	99	104	108	111	116	120	X	X
Per cent surpassed	3	16	33	50	64	75	84	90	94	97	99	99+	99+

Cf. also Anderson in *School and Society*, Vol. 11 (1920), page 419; Woodworth,¹ *Psychology* (Henry Holt & Co., 1921), page 279; and especially Bregman in *School and Society*, Vol. 29 (1926), pages 695-696.

¹ The author is particularly indebted to Professor Woodworth for assistance with these sources.

APPENDIX SEVEN

PERCENTILE DISTRIBUTION OF SCORES ON EACH ALPHA TEST OF WHITE DRAFT GROUP I (23, 874). A CORRESPONDING TABLE FOR OFFICERS IS GIVEN BY COBB AND YERKES (51 a, 475)

SCORE	TEST NUMBER							
	1	2	3	4	5	6	7	8
40				99			99	99
39				99			99	99
38				99			99	99
37				99			99	99
36				99			99	99
35				99			99	98
34				99			99	98
33				99			99	97
32				98			98	96
31				98			98	95
30				97			93	94
29				97			97	92
28				96			97	91
27				95			96	89
26				94			95	88
25				93	100		95	86
24				91	99		94	84
23				89	99		93	82
22				88	98		92	79
21		100		87	98	100	91	77
20		100		85	97	99	90	75
19		99		83	95	99	89	72
18		99		81	93	99	88	69
17		99	100	79	92	99	87	65
16		98	99	76	89	99	86	62
15		97	99	74	86	98	85	59
14		95	97	71	84	96	83	55
13	100	92	95	67	80	94	81	52
12	99	87	92	64	76	91	78	47
11	97	79	88	61	71	86	75	43
10	93	69	81	57	65	79	72	39
9	88	58	70	54	60	71	68	35
8	79	46	65	50	55	63	63	30
7	70	35	52	47	49	54	58	25
6	59	25	41	43	44	46	52	21
5	47	17	32	39	38	38	46	17
4	34	11	25	36	33	32	38	13
3	23	7	20	32	28	27	31	10
2	12	4	15	29	23	21	22	7
1	5	2	10	25	18	13	15	5

APPENDIX EIGHT

MEMORY FOR SENTENCES

12 Syllables

1. The road up the mountain was very rough and steep.
2. The price of potatoes is fifty cents a peck.
3. Last year fifteen new houses were built on this street.
4. The river flowed by with a pleasant soothing sound.
5. The path bent to the right and came out in a field.

16 Syllables

6. The breeze was strong and the sailboat sped along over the water.
7. The baseball game yesterday was won in the very last inning.
8. The sound of the wagon's departure died away on the night air.
9. The heavy snow which fell last night delayed the street cars and the trains.
10. The price of shoes is not as high now as it was during the war.

20 Syllables

11. When America was discovered, a new continent was opened to traders.
12. To take a picture of the moon, one must have a large camera and a good lens.
13. So far as is known, the first white settlers came to Hot Springs about 1800.
14. The church was cool and dark and at the far end there was a high altar of marble.
15. To keep any road in first-class condition it has to be repaired all the time.

24 Syllables

16. The clouds hung low in the valley, and the wind howled among the trees as the men walked on through the rain.
17. When the girl entered the car with her bag, all the seats were filled and people were standing in the aisles.
18. One thing that any nation must have to become rich and great is a large, secure supply of wood.
19. An old man sitting in the corner put down his paper and looked at him as he entered the room.
20. When the policeman heard the whistle, he stopped all traffic on the street to let the fire truck go through.

28 Syllables

21. As the great red sun came up over the hills, the Indians broke camp and prepared for another day's hard travel.

22. Last year there were only twenty children in the school, but this year there are fifty because the town has grown so fast.

23. The old stone quarry made a fine swimming pool where all the boys from town went swimming each day after school was over.

24. Sporting goods have never been so high in price as today, but sportsmen are buying the best grades as much as ever.

25. The coal miners' strike was very serious indeed because it kept so many men from work for such a long time.

APPENDIX NINE

TABLE FOR GENERAL PERCENTAGE SCORES (MQ), BASED ON A
NORM OF 127 POINTS

POINTS	M Q	POINTS	M Q	POINTS	M Q	POINTS	M Q
11	9	51	40	91	71	131	103
12	9	52	41	92	72	132	104
13	10	53	42	93	73	133	105
14	11	54	42	94	74	134	105
15	12	55	43	95	75	135	106
16	13	56	44	96	75	136	107
17	13	57	45	97	76	137	108
18	14	58	46	98	77	138	108
19	15	59	46	99	78	139	109
20	16	60	47	100	79	140	110
21	16	61	48	101	79	141	111
22	17	62	49	102	80	142	112
23	18	63	49	103	81	143	112
24	19	64	50	104	82	144	113
25	20	65	51	105	82	145	114
26	20	66	52	106	83	146	115
27	21	67	53	107	84	147	115
28	22	68	53	108	85	148	116
29	23	69	54	109	85	149	117
30	24	70	55	110	86	150	118
31	24	71	56	111	87	151	119
32	25	72	57	112	88	152	120
33	26	73	57	113	89	153	120
34	27	74	58	114	89	154	121
35	28	75	59	115	90	155	122
36	28	76	60	116	91	156	123
37	29	77	60	117	92	157	123
38	30	78	61	118	92	158	124
39	31	79	62	119	93	159	125
40	31	80	63	120	94	160	126
41	32	81	64	121	95	161	126
42	33	82	64	122	96	162	127
43	34	83	65	123	96	163	128
44	35	84	66	124	97	164	129
45	36	85	67	125	98	165	130
46	36	86	68	126	99	166	130
47	37	87	68	127	100	167	131
48	38	88	69	128	101	168	132
49	38	89	70	129	101	169	133
50	39	90	71	130	102	170	133

APPENDIX TEN

TABLE FOR REDUCING POINT SCORES TO PER CENTS OF THE NORM

ITEMS →	1-6	7-11	12-16	17, 18	19	20	21	22	23	24	25	26
NORMAL Av. →	11.8	7.2	9.1	18.4	13.8	5.7	6.3	8.2	16.5	5.1	9.9	15.3
Points												
1	8	14	11	—	—	18	16	12	6	20	10	7
2	17	28	22	—	—	35	32	24	12	39	20	13
3	25	42	33	—	—	53	48	37	18	59	30	20
4	34	56	44	—	—	70	64	49	24	78	40	26
5	42	70	55	27	36	88	79	61	30	98	50	33
6	50	83	66	—	44	105	95	73	36	118	60	39
7	58	97	77	—	51	123	111	85	42	137	70	46
8	67	111	88	—	58	141	127	98	48	157	80	52
9	75	125	99	—	65	158	143	110	54	177	90	59
10	83	139	110	54	73	176	159	122	61	196	100	65
11	91	—	—	—	80	—	175	—	67	—	—	72
12	100	—	—	—	87	—	191	—	73	—	—	78
13	—	—	—	—	94	—	—	—	79	—	—	85
14	—	—	—	—	102	—	—	—	85	—	—	92
15	—	—	—	82	109	—	—	—	91	—	—	98
16	—	—	—	—	116	—	—	—	97	—	—	105
17	—	—	—	—	123	—	—	—	103	—	—	111
18	—	—	—	—	—	—	—	—	109	—	—	118
19	—	—	—	—	—	—	—	—	115	—	—	124
20	—	—	—	109	—	—	—	—	121	—	—	131
21	—	—	—	—	—	—	—	—	127	—	—	137
22	—	—	—	—	—	—	—	—	133	—	—	144
23	—	—	—	—	—	—	—	—	139	—	—	150
24	—	—	—	—	—	—	—	—	146 etc.	—	—	157

APPENDIX ELEVEN

Name.....					
Sex.....		Birth date.....		School grade..... at.... years....	
Occupation.....		Lang. Difficulty		None...Some...Marked...	
DATE	EXAMINATION	SCORE	CONDUCT	EXAMINER	O.P.D. HOUSE

APPENDIX TWELVE

Don'ts for Psychometric Assistants in Mental Clinics

- Don't use terms of medical diagnosis in your examination reports.
- Don't think that "scatter" is always pathological.
- Don't say that your observation "shows" certain psychiatric symptoms, unless you are conversant with the case history and its interpretation.
- Don't make your reports any more technical than is absolutely necessary to give your meaning; you do not know into what untrained hands they may come.
- Don't volunteer therapeutic suggestions, but don't be unready to give them.
- Don't overlook the following items as they apply to yourself.

Don'ts for Medical Administrators of Mental Clinics

- Don't expect *every* patient to show a psychometric score that is good for anything but "statistics."
- Don't hurry your psychometric assistant and expect reliable results.
- Don't expect a patient to do himself psychometric justice in distracting or incongruous surroundings, like a hallway or a coat-room.
- Don't forget that while it is very hard for a dull individual to get a good score, it is quite possible for a bright one to get a low score.
- Don't try to decide for a competent examiner what tests to use or how to use them.
- Don't let your assistant or yourself get by with scores unsupported by comment as to their representative character.
- Don't restrict your assistant as to the qualifications with which numerical scores are recorded.
- Don't hand over numerical scores to other agencies without all the reservations that you yourself attach to them.
- Don't use a "six-weeks' tester's" results on the patient unless you know a lot more about psychometrics than your assistant does.

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